Federal Milk Marketing Orders: An Analysis of Alternative Policies. By Howard McDowell, Ann M. Fleming, and Richard F. Fallert. Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report Number 598. September 1988.

Abstract

Milk prices received by producers and paid by processors vary by region under the current system of Federal milk marketing orders. Yet, the system ensures sufficient milk supplies to consumers and provides economic stability to producers. The system could be modified so that it is more competitive and so that it increases economic efficiency while maintaining market stability and reducing risk. Such a system could reduce overall producer revenues and affect dairy product manufacturing, but it could also redistribute those revenues among regions, provide savings to consumers, reduce Government purchases of dairy products, generate more efficient shipping patterns, and reduce interregional marketing costs. This study focuses on four such modifications at two levels of dairy price supports: (1) removing the pricing practices that discourage reconstituting dairy products for fluid use, (2) establishing a single nationwide milk marketing order, as opposed to the numerous orders of the current system, (3) eliminating the classified pricing system, which increases the price of milk used in fluid (beverage) milk products, and (4) pricing Grade A milk for fluid use from multiple price-basing points rather than from the current single price-basing point in central Wisconsin.

Keywords: Classified pricing, dairy price supports, Federal milk marketing orders, milk prices, milk supplies, price-basing points, reconstitution

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Preface

Senators Robert Kasten of Wisconsin and Rudy Boschwitz of Minnesota requested that the U.S. Department of Agriculture examine the potential effects of modifying the Federal milk marketing order system. The Senators requested that the study include, but not be limited to, investigating the removal of economic barriers to reconstituting dairy products for fluid use, the establishment of a single national milk marketing order, and the elimination of Class I differentials. The study also investigates the establishment of a system of multiple basing points for setting minimum Class I prices for Grade A milk and examines how lower support prices affect each policy alternative.

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Summary

Milk prices received by producers and paid by processors vary by region under the current system of Federal milk marketing orders. Yet, the system ensures sufficient milk supplies to consumers and provides economic stability to producers. The system could be modified so that it is more competitive and so that it increases economic efficiency while maintaining market stability and reducing risk. Such a system could reduce overall producer revenues and affect dairy product manufacturing, but it could also redistribute those revenues among regions, provide savings to consumers, reduce Government purchases of dairy products, generate more efficient shipping patterns, and reduce interregional marketing costs.

This study focuses on four such modifications at two levels of dairy price supports, using 1985 as the base year for comparison:

- o Removing the pricing practices that discourage reconstituting dairy products for fluid use. Reconstitution is the process of removing water from milk to facilitate shipping and storing and replacing the water when and where the milk is ultimately used.

- o Establishing a single nationwide milk marketing order, as opposed to the numerous orders of the current system.

- o Eliminating the classified pricing system, which increases the price of milk used in fluid (beverage) milk products.

- o Pricing Grade A milk for fluid use from multiple price-basing points rather than from the current single price-basing point in central Wisconsin.

The Federal order system sets the minimum prices processors must pay dairy producers or their cooperatives for Grade A milk and establishes producer revenue-sharing pools. Federal orders apply only to Grade A milk. Grade A milk meets the higher sanitation standards required for milk used in fluid products, although only 45 percent of Grade A milk marketed is actually used in fluid products. The rest is used in manufactured dairy products, most requiring the less stringent sanitary standards set for Grade B milk.

The classified pricing provisions of the Federal order system set different minimum prices for Grade A milk according to its use. Grade A milk used for fluid milk products is designated Class I. Revenue pooling ensures that dairy producers (or their marketing cooperatives) receive the same weighted average "blend" price for all milk marketed in an order. Minimum Federal order prices for each class are based on the average price of Grade B milk in Minnesota and Wisconsin. Minimum Class I (fluid) prices east of the Rockies increase with distance from central Wisconsin. This price increase is called a Class I differential.

The Lake States and Corn Belt primarily ship milk to the Southern Plains and southern deficit regions (the Southeast, Deep South, and Florida), and the Mid-Atlantic region ships milk to the Northeast. The southern deficit regions are characterized by their relatively high Class I use and need to import milk in times of shortage.

The Federal order policy alternatives range from substantially less regulation, as under the no classified pricing alternative, to more extensive regulation, as under the national marketing order alternative. The multiple basing points and reconstitution alternatives represent intermediate levels of change.

Reconstitution

Removing the economic disincentives to marketing reconstituted fluid milk products reduces transportation costs. This alternative maintains the minimum Federal order prices under the single basing point system and places no limits on interregional shipments. Results show that national producer revenues, consumer expenditures, and Commodity Credit Corporation (CCC) expenditures change little from the 1985 base. Producer revenues rise 5 percent in the Lake States and 2-3 percent in the Northern Plains and California but fall 12-21 percent in Kentucky-Tennessee and the southern deficit regions. Consumer expenditures for fluid milk fall 3-10 percent. The declines are limited to Kentucky-Tennessee, the Southern Plains, and the southern deficit regions.

Interregional shipments increase 33 percent. Shipments from the Lake States to the southern deficit regions increase. Shipments from the Mid-Atlantic region to the Northeast decline as the Mid-Atlantic region becomes a supplier to the Southeast. California producers receive some economic incentive to become suppliers to the Southwest. Milk available for manufacturing declines 25 percent in the Southern Plains, 4 percent in the Northeast, 7 percent in the Mid-Atlantic region, and 1 percent in the Lake States. Milk available for manufacturing increases 100 percent in the southern deficit regions. Minimum Class I differentials at the 1985 level are higher than necessary to attract fluid milk into deficit regions with the use of reconstitution and its resulting lower transportation costs.

Results of the reconstitution alternative imply that further changes would take place in the system other than those just discussed. Implementing reconstitution with 1985 minimum Class I differentials would not likely induce the shipment increases just cited. Instead, operators of manufacturing plants would increase effective Class II prices for Grade A milk used for manufactured products to avoid underusing existing plant capacity. Increased Class II and blend prices in major exporting regions would keep manufacturing milk from flowing to higher priced markets. This results in greater revenue increases in major exporting regions and smaller revenue reductions in Kentucky-Tennessee and southern deficit regions. Interregional shipments would increase under reconstitution about 16 percent as opposed to 33 percent.

National Milk Marketing Order

All Grade A producers receive the same blend price under this alternative, regardless of how the milk is used. Class I prices are administratively set at their 1985 levels, and processors pay into one national pool based on their use of milk. Results show that national producer revenues, consumer expenditures, and CCC expenditures remain near their 1985 levels. Producer revenues increase up to 10 percent in the Lake States, California, the Northwest, and the Northern Plains, which are regions with lower than average Class I prices and use. Revenues decline 15-36 percent in Kentucky-Tennessee and the southern deficit regions, which are regions with relatively high Class I prices and use. Regional consumer expenditures remain unchanged, reflecting that fluid milk prices remain at their 1985 levels.

Interregional shipments fall 65 percent, with shipments east of the Rockies consisting only of those from the Corn Belt and Kentucky-Tennessee to the southern deficit regions. Regional blend price differences no longer attract milk flows to deficit regions. Administrative decisions are used to ensure sufficient fluid supplies in deficit regions. Milk available for manufacturing falls 30-50 percent in the Southern Plains and Kentucky-Tennessee and 17 percent in the Northeast. Milk available for manufacturing rises 7-13 percent in the Mid-Atlantic region and Lake States.

No Classified Pricing

This alternative eliminates classified pricing and pooling of milk but maintains dairy support prices. Thus, regional price differences are market generated. That is, they are determined by regional Grade A milk supplies, demand for milk in fluid and soft manufactured products, interregional transportation costs, and regional costs of marketing milk in fluid and soft product uses. Results show that national producer revenues drop about 10 percent (milk production drops 3 percent), consumer expenditures drop 14 percent, and CCC expenditures drop 40 percent. Producer revenues fall the least (7-8 percent) in the southern deficit regions, Lake States, Southern Plains, and California. Revenues in the Northeast, Mid-Atlantic region, and Southwest fall the most (an average of 18 percent). Consumer expenditures regionally decline 6-20 percent.

Interregional shipments fall 50 percent, with shipments east of the Rockies consisting only of those from the Corn Belt and Kentucky-Tennessee to the southern deficit regions. Reduced locally available milk supplies and changed shipping patterns put economic pressure on the milk manufacturing industries in the Northeast, Corn Belt, and Southern Plains. Reduced exports from the Lake States result in more milk available for manufacturing. In all but five regions, fluid milk prices exceed the average price of Grade B milk in central Wisconsin (under the 1985 base) by no more than 22 cents, which is the estimated regional fluid milk marketing cost. Market forces generate additional increases in fluid milk prices of about $1.50 in Kentucky-Tennessee; $2.00 in the Southeast, Deep South, and Southern Plains; and $4.00 in Florida.

Multiple Basing Points

Six regions having less than 60 percent Class I (fluid) use serve as price-basing points along with the Lake States under this alternative. This alternative maintains minimum Class I prices and revenue pooling, and thus, the market-stabilizing benefits of the current Federal order system. However, the regional price structure for producers, processors, and consumers changes substantially. Lowering effective Class I prices in the six additional basing points also significantly reduces effective Class I differentials in the remaining regions. Results show that lower national minimum prices reduce producer revenues 5 percent, consumer expenditures 6 percent, and CCC expenditures 19 percent. Producer revenues fall 7-12 percent in the Northeast, Mid-Atlantic region, southern deficit regions, Southwest, and Kentucky-Tennessee, and less than 5 percent in the remaining regions. Consumer expenditures decline 9-11 percent in the Mid-Atlantic region, Northeast, and Southwest, and at least 4 percent in all other regions, except California, which has no change.

Interregional shipments fall 65 percent. Establishing additional basing points allows deficit regions to import needed supplies from closer sources. Shipments east of the Rockies consist only of those from the Corn Belt and Kentucky-Tennessee to the southern deficit regions and small amounts from the Northern Plains to the Southern Plains. Milk available for manufacturing drops 2-3 percent nationally but rises in the Mid-Atlantic region, Lake States, and Northwest. Milk available for manufacturing drops over 20 percent in the Northeast and Southern Plains.

Lower Support Prices

This study also analyzes the effects of reducing the support price from the 1985 average of $11.97 to $11.10 per cwt. The study evaluates the effects of the support price cut alone and the support price cut along with each of the Federal order alternatives. Results of the support price cut alone show that national producer revenues

fall 11 percent, consumer expenditures on fluid milk fall 7 percent, and CCC expenditures fall 56 percent. In each region, producer revenues fall 9-13 percent and consumer expenditures fall 6-8 percent. Interregional shipments drop about 12 percent. For an estimate of the combined effects of Federal order policy changes and the support price cut, add the effects of each Federal order policy change with the effects of the support price cut.

Overview

The current Federal milk marketing order system has important and significant economic effects on the dairy industry. Alternative Federal order provisions directly affect Grade A milk producers and fluid milk consumers and affect taxpayers as CCC purchases vary. Because the dairy support price is linked to CCC purchase levels, alternative Federal order provisions indirectly affect Grade B milk producers and consumers of manufactured dairy products.

o The overall level of Federal order Class I differentials is directly related to Grade A producer revenues, consumer expenditures, and CCC purchases. For example, under 1985 conditions, each $1 reduction in the weighted average Class I differential reduces CCC purchases about 2.5 billion pounds. In comparison, each $1 reduction in the support price reduces CCC purchases about 8 billion pounds.

o The current system's Class I differentials and shipping requirements for pool qualifications directly influence regional milk production, fluid milk consumption, distribution of producer revenues, and consumer expenditures on fluid milk; interregional marketing patterns; and regional location and structure of the milk manufacturing industry.

o The no classified pricing and multiple basing points alternatives show the adjustments and market performance gains that moving towards a more competitive or cost-based system could provide. Producers in the Northeast, Mid-Atlantic region, and Southwest are the most disadvantaged, but fluid milk consumers in these regions gain the greatest benefits. Producers in the Lake States, Southern Plains, and southern deficit regions are the least disadvantaged. The multiple basing points alternative provides most of the benefits of a no classified pricing alternative and retains the stability benefits of the current Federal order system. The multiple basing points or no classified pricing alternatives, with reduced fluid milk differentials, remove much of the incentive for reconstitution.

o Reconstitution with 1985 Class I differentials significantly raises producer revenues in the Lake States and significantly reduces producer revenues and consumer expenditures on fluid milk in the southern deficit regions. Because of the regional effects, further policy debate would likely emerge concerning further adjustment in minimum Class I differentials east of the Rocky Mountains and provisions governing revenue pooling.

o A national order that incorporates a single national revenue pool redistributes revenues in favor of regions with low Class I use under the current system. Producers in Kentucky-Tennessee and the southern deficit regions are the most disadvantaged under the national order alternative. Producers in the Lake States and the Northwest, with no market-generated incentives to serve deficit markets, benefit the most from the national order alternative.

Introduction

Federal milk marketing orders are authorized by the Agricultural Marketing Agreement Act of 1937 but trace their origin to the Agricultural Adjustment Act of 1933. The order system sets the minimum prices processors must pay to dairy farmers or their cooperatives for Grade A milk and establishes producer revenue pools for those areas of the country where a majority of producers agree to establish an order. In so doing, the current milk marketing order system works both to increase dairy farmers' revenues and to influence the regional distribution of revenues.

This study responds to a request from Senators Boschwitz and Kasten that the U.S. Department of Agriculture (USDA) analyze the effects of changing the Federal milk marketing order system to:

- o Remove economic barriers to reconstituting dairy products for fluid use (the removal of water from milk to facilitate shipping and storing and the replacement of the water when and where the milk is ultimately used).

- o Establish a single national milk marketing order in contrast to the 43 orders under the current system.

- o Eliminate Class I differentials (the price premiums provided for in the order system for Grade A milk in fluid use).

Legislation currently before Congress suggests establishing multiple basing points (locations with minimum Class I differentials and from which transportation-linked Class I differentials in other regions are calculated) as part of an order system. Previous studies also suggest that establishing multiple price-basing points would be consistent with a more market-oriented pricing system. In addition, Federal price supports for manufacturing milk come into play in Federal orders because the price supports provide a price floor under the entire milk marketing system, including the Federal order system. Therefore, the study also considers:

- o Establishing multiple basing points for setting minimum Class I prices for Grade A milk for fluid use.

- o Lowering manufacturing milk price support levels.

The current debate over the Federal milk marketing order system is set against a backdrop of large milk surpluses, high and rising dairy program costs, and a series of program initiatives designed to move the market back into balance. Surpluses rose from 1979 to 1983 until milk production exceeded commercial use by nearly 17 billion pounds, or 12 percent of production. By 1987, Commodity Credit Corporation (CCC) purchases had fallen to 6.7 billion pounds, 5 percent of production.

Policy changes helped ease this problem somewhat after the mid-1980's. The Dairy Diversion Program, implemented in 1984, and the Dairy Termination Program, implemented in 1986, focused on reducing milk production capacity. The Food Security Act of 1985 (FSA) tied price supports to CCC purchases of surplus dairy products. If anticipated purchases are outside a specified range, the support price must be adjusted.

But, the FSA also increased Class I differentials in most regions east of the Rockies. This change in differentials partially offset lower manufacturing support prices and changed regional milk price relationships. These changes in price structure have generated considerable interest in the regional effects of the Federal order system. Therefore, the study also analyzes the regional effects of the alternative order provisions and support price levels.

How Federal Milk Marketing Orders Work

Federal milk marketing orders set the minimum prices that processors must pay dairy farmers or their cooperatives for Grade A milk in markets where producers have elected to establish an order. The 43 Federal milk marketing orders operating on January 1, 1988, regulate the pricing of about 70 percent of all milk sold to plants and dealers. The remaining milk is either regulated by State provisions or is unregulated.

Federal orders apply only to Grade A milk, which makes up 88 percent of the total milk supply. All Grade A milk meets the higher sanitation standards required for milk used in fluid products, although only 45 percent of Grade A milk marketed is actually used in fluid products. The rest is used in manufactured dairy products, most requiring the less stringent sanitary standards set for Grade B milk.

The Federal milk marketing order system of classified pricing and revenue pooling reflects different uses and values of Grade A milk. The minimum price of Grade A milk in fluid use is set higher than its price in manufacturing use. However, all producers in a single order receive the same price, the weighted average price, or "blend price," for all the Grade A milk sold, or "pooled," in that order. These classified pricing and pooling provisions are described in this section in detail.

Classified Pricing

The classified pricing provisions of the Federal order system set different minimum prices for Grade A milk according to its use. Grade A milk used for fluid milk products is designated Class I. Most orders have two other classes for Grade A milk use: Class II for milk used in cream and soft manufactured dairy products (such as ice cream, cottage cheese, and yogurt) and Class III for milk used in hard manufactured dairy products (such as cheese, butter, and nonfat dry milk) (fig. 1).

Minimum Federal order prices for each class are based on the average price of Grade B milk in Minnesota and Wisconsin (the M-W price). Use of this M-W price as the Federal order base price establishes a direct link between the order system and the manufacturing milk market. The Class III price is set equal to the M-W price, while the Class II price uses a product price formula to update the M-W price and is generally about 10 cents higher than the Class III price (fig. 2).

Class I prices are set higher than the M-W price by fixed differentials unique to each Federal order. These differentials were originally linked to the transportation cost of moving milk for fluid use from surplus to deficit regions. They were designed to ensure that adequate supplies of high-quality milk were available locally to meet fluid needs. The continued need for these differentials and their size are at the center of the current order debate.

Until passage of the FSA, the basic structure of minimum Class I differentials had not changed since 1968. Changes were normally made through a USDA hearing process involving producers and processors. The FSA's legislated changes in differentials were a departure from normal procedure. Before the FSA, minimum Class I differentials east of the Rocky Mountains generally increased by about 15 cents per hundredweight (cwt) per 100 miles from Eau Claire, Wisconsin. This area in central Wisconsin produces large supplies of Grade A milk over and above local fluid needs that are available for shipment to deficit areas or used locally to produce manufactured products. The FSA generally retained the single basing point system but increased minimum Class I differentials more in markets with relatively greater Class I use.

Actual Class I prices paid by processors often exceed minimum order prices by an over-order payment. Over-order payments reflect:

- o Additional transportation costs not reflected in minimum order prices.
- o The cost to producers and their cooperatives of providing fluid milk of specified quality and/or butterfat content to processors at specified times and places.
- o The premium paid by fluid milk processors to attract milk away from profitable manufacturing operations ("give-up charges").

Figure 1

Milk quantity flows

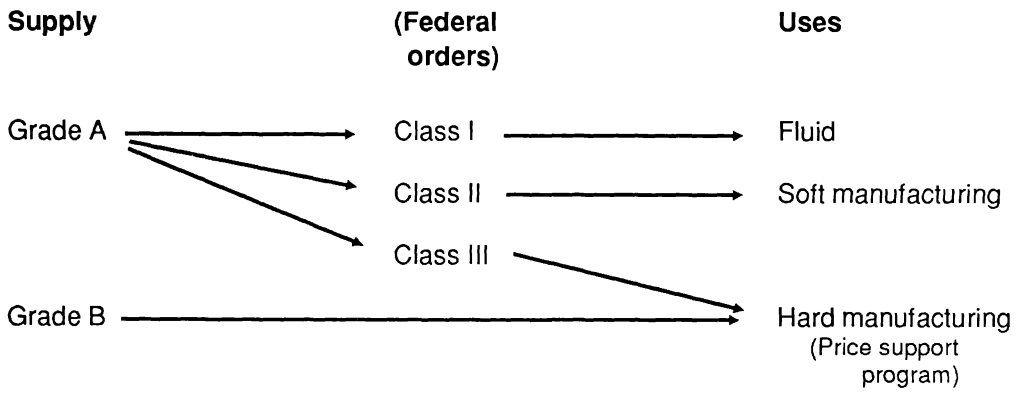
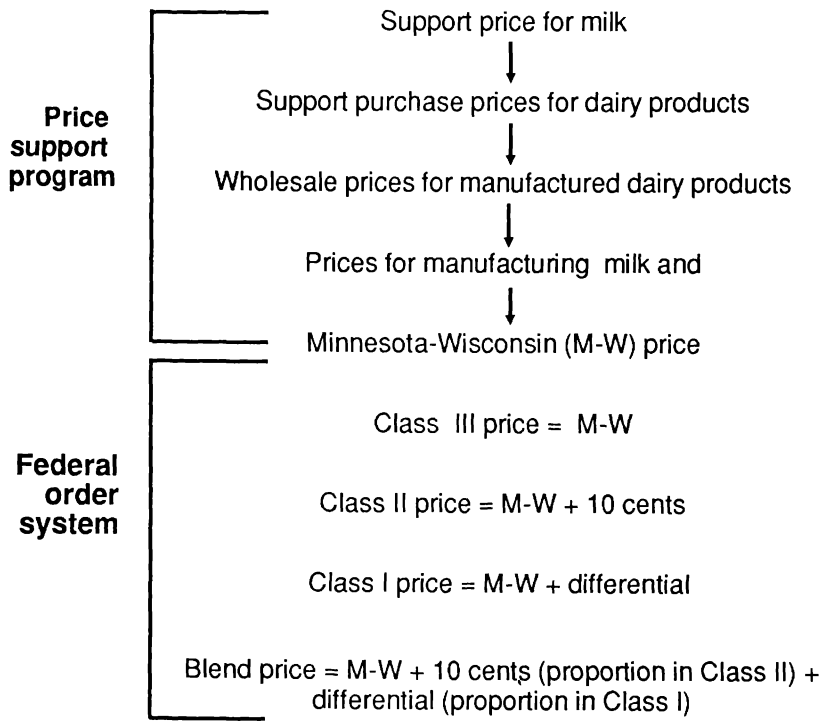


Figure 2

Price linkages between the price support program and Federal orders



The value of over-order payments can differ from actual costs, a result of market power in the hands of the buyer or seller.

Federal orders do not directly control the uses or movement of milk but work indirectly through price incentives. Prices milk producers receive and processors must pay for milk in alternative uses affect milk production and interregional milk and product flows.

Orderwide Pooling

Each Federal milk marketing order establishes a revenue pool for all Grade A milk associated with, or "pooled" in, the order. Processors pay into the pool the minimum prices for the milk they use in each class. An orderwide weighted average price, or "blend" price, is paid to all producers or their cooperatives delivering milk to regulated processors. Thus, processors pay identical minimum prices into the pool based on their individual uses, while producers or their cooperatives receive the same blend price based on the orderwide use of milk in the different classes.[1] Over-order payments take place outside of the regulatory system and are negotiated directly between buyers and sellers.

Producers and their marketing cooperatives may market milk to any Federal order and, if they meet the pooling qualifications, receive the monthly blend. The interregional marketing costs in this study are determined by the average cost of transporting milk and the proportion of milk pooled in a given order that must actually be transported to qualify for pooling under the order (see Appendix I for greater detail).

Allocation Provisions and Compensatory Payments

Processors whose milk is pooled under Federal orders may also receive milk from areas covered by other orders and from unregulated and State-regulated areas. Prices for milk received from unregulated sources are negotiated between processors and producers or their cooperatives. In determining the use value (payments into or credits from the pool) of milk for producers regulated by a Federal order, the market administrator assigns all the milk from unregulated sources that exceeds 125 percent of a processor's Class I needs to the lowest valued uses: Class III first, then Class II. The procedure is called "down allocation." This procedure reserves as much of the Class I allocation as possible for producers from within the order and increases the order's blend price.

Any unregulated milk from outside the order that is allocated to Class I is subject to an assessment, called a "compensatory payment," equal to the difference between the order's Class I price and its blend price. In some cases, the payment is the difference between the order's Class I and Class III prices. Thus, these regulations discourage importing unregulated milk for fluid use when sufficient supplies are locally available. If a processor's milk receipts are less than 125 percent of Class I use, the administrator assigns a pro rata classification to all receipts.

Restrictions on Reconstituted Milk

Processors are required to pay more for reconstituted milk than for regulated raw milk because of down allocation and compensatory payments. A compensatory payment on reconstituted milk is the difference between the Class I and Class III prices. Payments are levied on the fluid equivalent of the milk ingredients (nonfat dry milk, condensed milk, and butterfat) used to reconstitute milk after it has been processed, stored, and/or shipped. Thus, processors must pay and producers receive the full Class I value for reconstituted fluid milk. These pricing practices, combined with the extra costs of drying and concentrating milk ingredients, discourage the use of reconstituted milk when milk is available locally to meet fluid needs at Class I prices.

How the National Dairy Price Support Program Interacts With the Federal Order System

The dairy support price directly affects Grade B and most Grade A milk and undergirds the price structure of all milk marketed in the United States (see figs. 1 and 2). In carrying out the national price support program, the Government (CCC) offers to buy surplus butter, nonfat dry milk, and cheddar cheese at announced prices. These purchase prices are set high enough to cover processing costs and to allow processors to pay

[1] Two of the 43 Federal milk orders (Memphis and Michigan Upper Peninsula) have individual processor (handler) pools. The blend prices received by producers are based on the use value of milk in the plant to which they deliver rather than the orderwide weighted average price on all milk pooled in the receiving order. Each order may require that 50-75 percent of the milk pooled be shipped during specified time periods to qualify for the blend price. Producers or cooperatives have an incentive to market milk to distant orders as long as the effective blend price in distant markets exceeds the local blend price by at least the interregional marketing cost.

farmers the announced support price for manufacturing milk.

The dairy support program does not guarantee each milk producer the support price. Prices for manufacturing milk paid by individual processors are free to move both above and below the support price if supply and demand conditions warrant. The prices actually received by individual dairy farmers also depend on plant location, product manufactured, quality of milk delivered, butterfat content, local competition for milk, and plant operating efficiency.

The price support program and the Federal order system interact through the M-W price. The dairy price support program undergirds the M-W price and keeps it close to the support price when supplies exceed commercial market needs. When supplies are relatively tight or when supply and demand are fairly close, the M-W price will move above the support price. Since prices are based on the M-W price, the whole Federal order pricing structure will rise or fall with the M-W price.

State Milk Regulation

State milk regulation at the producer level is generally declining in importance. An exception is California, where production and pricing of milk at the State level are increasing in significance. California accounted for only 7 percent of the Nation's milk supply in 1967, 10 percent in 1977, and nearly 13 percent in 1987.

California Pricing

The State of California has set milk prices since its milk control program began in 1935. California is geographically isolated from most other major milk producing areas in the country, and only a small amount of raw milk or packaged fluid milk products moves across State lines.

California milk prices are not tied to the M-W price like Grade A milk prices are in the Federal order system. Since 1978, the State has used an economic formula to set the fluid milk price. Some of the factors in the formula include production costs, dairy product prices, and a measure of consumers' spendable earnings.

Another difference in California milk pricing is the quota plan associated with the fluid milk market. The base and quota belong to the individual producer and can be bought and sold without restrictions. The average market value of a production quota in 1987 was $1,650 per cow. New producers and those who expand milk production and are not covered by the quota receive a lower "over-base" price for the milk they market over the base. This over-base price is generally around 75 cents per cwt lower than the M-W price.

Federal Order Issues

Changes in the structure of the dairy industry and in demand for dairy products over the last three decades, especially from the late 1970's through the 1980's, have stimulated debate about the Federal order system. Questions focus on whether orders are still needed to ensure adequate supplies of fresh milk and to stabilize prices, whether orders contribute to the milk surplus problem, whether orders impede technological progress, and how orders affect regional differences in prices and returns.

Ensuring Supplies of Fresh Milk

When Federal orders began operating in the mid-1930's, the major challenges to the sector were to provide consumers with a reliable supply of high-quality fresh milk and to achieve greater equity in the bargaining positions of farmers and processors. Fresh milk is not only bulky but highly perishable and subject to bacterial and other contamination. Hence, it must be produced and handled under sanitary conditions and marketed quickly, either for drinking or for transforming into storable manufactured dairy products.

In addition, the seasonal patterns of production and consumption vary significantly, with peak production periods in the spring and peak consumption periods in the fall. Thus, to ensure sufficient available supplies at peak demand times, more Grade A milk must be available to a market than is needed for fluid use. This is facilitated with classified pricing and marketwide pooling of all Grade A milk associated with a market. By setting higher prices for milk in fluid use, average prices received by Grade A producers are raised, thus increasing Grade A milk production and providing stable fluid milk supplies (*14, 17*).[2] Grade A milk made available, but not needed, for fluid use is processed into manufactured products.

The process of moving milk between uses and processors to meet fluctuating needs is called "balancing" the market. Minimum Class I differentials for Grade A milk reflect some of the balancing costs, and over-order payments negotiated between buyers and sellers generally cover the rest. Some system of balancing markets and allocating revenues from manufacturing and fluid uses would be needed, regardless of whether milk markets were organized under a Federal, State, or private system.

Moreover, the seasonality rationale for orders is also changing. Variations in production and consumption during the year have declined over time due to a number of factors. Federal order pricing systems and cooperative marketing policies in some markets encourage production during peak consumption periods in the fall and have reduced the seasonality of milk production. Furthermore, the practice of feeding dairy cows more concentrates, which reduces reliance on pasture, also has eased fluctuations in output. Improvements in shipping technology and better interstate highways have also reduced dependence on local markets.

Several studies in the 1970's and 1980's indicate that minimum Class I differentials may exceed levels needed to ensure adequate supplies, including necessary reserves, of Grade A milk for fluid use in some regions (*4, 8, 9, 12, 15, 18*). This is partly due to technological advances that lower the cost of producing and marketing Grade A milk.

Accelerated adoption of both existing and emerging technology, such as reverse osmosis filtration for reconstitution, could address some of the industry's remaining perishability, bulkiness, and seasonality problems. However, accelerating technological change in milk marketing depends on changing Federal order provisions. Such changes would likely alter the relative economic positions of producers among the different regions and possibly by size and type of farm. Furthermore, such changes could radically alter the dairy processing industry. Plants in many locations could be placed in an unprofitable economic position under an alternative set of regulations, while others could benefit.

Price and Market Stability

The order system was designed to ensure price and market stability and equalize milk procurement costs among processors within a Federal order. The dairy industry has had market concentration problems in

[2]Italicized numbers in parentheses refer to literature citations in the References section.

processing and manufacturing since the 1930's (*25*). Concentrated market power on the side of the dairy processing industry could lead to lower than competitive prices to farmers and affect consumers through disrupted milk markets. By setting minimum prices that processors must pay dairy farmers for milk in defined uses, Federal milk marketing orders effectively limit the extent that such market power can be exercised. Processor's records are audited to verify processor's payments into the marketwide pool, thereby determining marketwide blend prices to producers. This ensures equitable treatment of producers by processors.

Market concentration continues to be a potential problem as economies of size in dairy farming, in producer cooperative milk marketing operations, and in the fluid milk processing industry lead to fewer and larger firms and operations. Thus, an argument can be made for continuing the Federal milk marketing order system with a goal of providing orderly marketing and stability to the fluid milk industry.

Surpluses

Reducing surplus production has replaced concerns about ensuring adequate supplies of fresh milk as the most immediate challenge facing the industry. Milk surpluses rose from near zero in the late 1970's to a peak of nearly 17 billion pounds, or 12 percent of production, in 1983. As a result, net expenditures on dairy price support and related programs averaged nearly $2 billion per fiscal year for 1979-86 compared with about $300 million per year for 1970-78. However, the milk surplus declined to 6.7 billion pounds in 1987, and net expenditures were $1.2 billion for fiscal year 1987.

The 1980's milk surplus is related to a number of factors, including high and rising price supports from 1977 through the early 1980's and technology- and management-related gains in productivity. Support prices rose from $9.00 per cwt in 1977 to a peak of $13.10 in 1982. The FSA reacted to mounting surpluses by linking support prices to the anticipated volume of CCC purchases of dairy products. The dairy support price was reduced 50 cents (from $11.10 to $10.60 per cwt) on January 1, 1988, and will be reduced 50 cents more on January 1, 1989 and 1990, if projected CCC purchases for the following calendar year exceed 5 billion pounds of milk equivalent.[3] The support price will be raised 50 cents per cwt if projected purchases are below 2.5 billion pounds of milk equivalent.

The January 1, 1988, support price cut translated into lower manufacturing milk prices and lower revenues for both Grade B and Grade A producers. However, the increases in the Class I differentials and fluid milk prices that the FSA implemented provided Grade A producers at least a partial offset of the lower manufacturing milk price through increases in the Grade A blend price.

Relatively low feed costs, combined with continued advances in productivity, have also raised output per cow, reduced per-unit production costs, and helped keep milk production high, despite declining real prices. Unfavorable employment opportunities for dairy farmers in the early 1980's both in other farm enterprises and off the farm also helped minimize contraction.

Reconstitution Issues

Technological advances affecting milk marketing are also creating pressure to change Federal order system provisions. The most important of these developments are advances in reconstitution that allow water to be removed from milk before shipping or storing without affecting the taste of the reconstituted product. This in turn significantly reduces transportation costs and provides a rationale for lower Class I differentials in deficit milk production areas that must import part of their supplies.

Until recently, discussions of reconstituting dairy products for fluid use have generally assumed that nonfat dry milk and butter oil would be the products used for reconstitution. These options have been analyzed and, under certain conditions, appear to be economically feasible (*16, 21, 28, 29, 38, 39*).

Advances in membrane filtration technologies, such as reverse osmosis, have renewed interest in reconstitution. Reverse osmosis filtration, a membrane concentration process, removes only water from milk. But unlike evaporation, reverse osmosis requires no heat and the final composition and taste of the reconstituted milk would be similar to regular milk. Some advocates of reconstitution favor the processing and marketing of a blended fresh and reconstituted milk product. This blend could increase flexibility in the use of reconstitution and reduce potential problems of consumer acceptance. Since the concentrate remains in fresh form (perishable), reconstitution using reverse osmosis would be less likely to undermine the classified pricing system than widespread adoption of reconstituting milk from storable condensed milk and/or nonfat dry milk.

[3]The announced support prices are for the 3.67-percent national average butterfat content of producer milk. The January 1, 1988, support price is $10.33 for milk of 3.5-percent butterfat content.

Hence, reverse osmosis filtration could be a much more attractive marketing alternative (*13, 21, 40*).

The widespread use of reconstitution would require changes in both Federal and State milk marketing regulations. The down allocation and compensatory payment provisions in the order system discourage reconstitution. Another constraint on reconstituting milk is the State-labeling regulations for reconstituted fluid milk products. Regional consumption and production, interregional marketing patterns, and the location of the milk manufacturing industry would substantially change if Class I differentials were reduced to the extent allowed by reductions in transportation costs. Allowing use of nonfat dry milk for reconstitution (not addressed in this study) would provide the opportunity for converting Grade A milk into nonfat dry milk during flush production periods and storing it for use when Grade A milk supplies are short. Reconstitution could also possibly address daily and weekly fluctuations.

Regional Issues

The geographic distribution of milk production has changed sharply over the last several decades, increasing concern about regional equity. Milk production is shifting to the West and Southwest from more traditional dairy States, particularly those in the center of the United States. In 1970, California ranked fourth in total milk production, following Wisconsin, New York, and Minnesota. California now produces 13 percent of the Nation's milk supply and ranks second in milk production after Wisconsin. Five States now produce half of the total milk supply, and 10 States produce two-thirds.

Milk costs and returns data and enterprise analysis by size and region indicate that costs differ substantially across regions and that significant economies of size exist in all regions (*1, 2, 5, 27*). In addition, these studies show that the cost advantage of large specialized southwestern dairies is substantial. Climate and the availability of low-cost water for irrigation are major advantages in the West and Southwest because they facilitate high-quality forage production. Research further indicates that the inability to control hay and forage quality due to climate uncertainties is a serious disadvantage for producers in the more traditional, less temperate dairy areas. Also, regions with mild climates require smaller investment in dairy buildings. Furthermore, the large, specialized dairies located primarily in the West, Southwest, and Florida use their facilities more intensively and are able to spread their overhead or fixed costs over more units of milk produced. Milk production costs and returns data for 1986 indicate that profitability is highest in the Pacific and Southern Plains regions (table 1).

The influence of Federal milk marketing orders, State milk regulations, and the dairy price support program on total and regional milk production and consumption is the subject of increasing concern. Class I differentials above cost-based levels in general and in specific markets and regions are issues of continuing debate. As will be shown in the results of this study, Class I differentials may have contributed to both the regional expansion of milk production and the national dairy surplus problem.

The FSA and subsequent changes in dairy policy have increased these regional concerns. After 20 years of essentially no changes in minimum Class I differentials, the FSA legislated higher Class I differentials in 35 of 44 Federal orders, with the changes in differentials ranging from 10 cents to $1.03 per cwt (table 2). This procedure of legislating changes in Federal order provisions is a significant departure from the traditional way of making changes based on the hearing process.

Dairy price support policy has also changed in the 1980's and has affected producers in various regions differently. Since 1981, there have been three major changes in dairy price support policy:

- o The link between support prices and parity was broken.
- o Voluntary supply management provisions were added to the program (that is, the Dairy Diversion Program in 1984 and the Dairy Termination Program in 1986). The Secretary was given discretion to implement similar programs through 1990.
- o Support prices and Government purchases were linked.

Increasing debate on the direction of policy and increasing calls for congressional action reflect the importance of regional issues. Producers in some regions claim that they are not contributing to the national dairy surplus problem because manufacturing plants in their States or regions are selling little or no surplus dairy products to the Government. Some of these producers are petitioning Congress to regionalize the national dairy price support program.

On the other hand, some segments of the industry, primarily areas of low fluid use, are suggesting establishing a nationwide Federal milk marketing order. This change would allow the revenues from markets with higher Class I prices and/or use to be shared more evenly with producers in surplus order areas with low Class I prices and use.

Table 1--U.S and regional milk production costs, 1986

Item	United States	Appalachia	Corn Belt	Northeast	Pacific	Southern Plains	Upper Midwest
			Dollars per cwt				
Cash receipts:							
Milk	12.42	13.21	12.27	12.72	11.83	13.65	12.15
Total	13.36	14.01	13.18	13.61	12.53	14.46	13.28
Cash expenses:							
Variable--							
Feed	4.33	5.31	4.32	4.23	4.95	5.37	3.85
Total	7.14	8.57	7.21	7.38	7.61	8.32	6.32
Fixed	2.04	1.80	2.00	1.73	1.31	1.97	2.71
Total cash expenses	9.18	10.37	9.21	9.11	8.92	10.29	9.03
Total economic costs	11.70	12.74	12.69	12.14	9.43	11.25	11.74
Residual return	1.66	1.27	.49	1.47	3.10	3.21	1.54

Source: (35).

Table 2--Class I differential changes under the Food Security Act of 1985 1/

Federal order	Differential Pre-FSA	Differential FSA	Increase	Federal order	Differential Pre-FSA	Differential FSA	Increase
	Dollars per cwt				Dollars per cwt		
New England	3.00	3.24	0.24	Tennessee Valley	2.10	2.77	0.67
New York-New Jersey	2.84	3.14	.30	Nashville	1.85	2.52	.67
Middle Atlantic	2.78	3.03	.25	Paducah	1.70	2.39	.69
				Memphis	1.94	2.77	.83
Georgia	2.30	3.08	.78	Fort Smith	1.95	2.77	.82
Alabama-West Florida	2.30	3.08	.78				
Upper Florida	2.85	3.58	.73	Central Arkansas	1.94	2.77	.83
Tampa Bay	2.95	3.88	.93	Southwest Plains	1.98	2.77	.79
Southeastern Florida	3.15	4.18	1.03	Texas Panhandle	2.25	2.49	.24
				Lubbock	2.42	2.49	.07
Upper Michigan	1.35	1.35	0	Texas	2.32	3.28	.96
Southern Michigan	1.60	1.75	.15	Louisiana	2.47	3.28	.81
Eastern Ohio-Western Pennsylvania	1.85	2.00	.15	New Orleans-Mississippi	2.85	3.85	1.00
Ohio Valley	1.70	2.04	.34				
Indiana	1.53	2.00	.47	Eastern Colorado	2.30	2.73	.43
Chicago	1.26	1.40	.14	Western Colorado	2.00	2.00	0
Central Illinois	1.39	1.61	.22	Southwestern Idaho-Eastern Oregon	1.50	1.50	0
Southern Illinois	1.53	1.92	.39	Great Basin	1.90	1.90	0
Louisville-Lexington-Evans	1.70	2.11	.41	Lake Mead	1.60	1.60	0
				Central Arizona	2.52	2.52	0
Upper Midwest	1.12	1.20	.08	Rio Grande Valley	2.35	2.35	0
Eastern South Dakota	1.40	1.50	.10				
Black Hills	1.95	2.05	.10	Puget Sound-Inland	1.85	1.85	0
Iowa	1.40	1.55	.15	Oregon-Washington	1.95	1.95	0
Nebraska-Western Iowa	1.60	1.75	.15				
Kansas City	1.74	1.92	.18				

1/ Changes in the Class I differentials became effective May 1, 1986.

Federal Order Alternatives and Economic Framework

Alterations to the Federal milk marketing order system studied are (1) removing reconstitution barriers, (2) establishing a national milk marketing order, (3) eliminating classified pricing and pooling, and (4) establishing multiple basing points for setting minimum Class I differentials. This study analyzes each of these policy alternatives at two price support levels. The means of analysis, specific assumptions, and a summary of the base data and model are described here, and results are discussed in the following section.

This study uses a simulation model of the dairy industry to assess the effect of changes in order provisions and price supports on producer revenues, taxpayer costs, and consumer expenditures.[4] The model uses 1985 as a base year to minimize the effects of the 1984 Dairy Diversion and 1986-87 Dairy Termination Programs. The 48 contiguous States are aggregated into 14 regions by grouping Federal milk marketing orders and other fluid markets (fig. 3). Each region is treated here as if it were a single Federal milk marketing order. The Lake States region is used as the single basing point instead of Eau Claire, Wisconsin.

In analyzing the four Federal order alternatives, the study focuses on several key policy variables, including Class I differentials, pooling regulations, and support prices. Changes are made in Class I differentials and in levels of over-order payments. Two dairy price support levels are considered, allowing for the comparison of the effects of changing Federal order policy with different support price levels. The study analyzes the effects of policy changes on regional producer prices and revenues, regional Grade A and Grade B milk marketings, regional fluid milk consumption, and interregional marketings of Grade A milk for fluid uses. The study also analyzes the effects on national commercial use, CCC purchases of manufactured dairy products, and regional milk available for manufacturing.

This study assumes that 4 years would elapse from the time a change in order provisions is initiated and its final effect is reached. All factors other than the order provisions being analyzed are held constant. Increases in productivity and shifts in demand attributed to factors other than milk prices are not considered. Thus, the study provides a long-term comparative analysis of the direction and magnitude of the economic effects of implementing alternative Federal order policies. The results should not be interpreted as forecasts.

[4]See Appendix I for a detailed explanation of the simulation model, model parameters, and specific assumptions under each policy alternative used in this study.

Reconstitution

The effects of removing barriers to reconstitution are analyzed here by assessing how resulting reductions in transportation costs would affect the location of milk production, regional fluid milk demanded, shipments between regions, and the location of milk manufacturing plants. The study assumes that reverse osmosis filtration would be used to develop a 50-percent concentrate, thereby cutting transportation costs by about half, while incurring a cost of 35 cents per cwt for concentrating and recombining. This analysis also assumes that the regional minimum Class I differentials existing in 1985 would remain in effect and that consumers would completely accept reconstituted milk for fluid uses.[5] With all other factors held constant, such a change would significantly benefit producers in exporting regions and consumers in importing regions.

National Milk Marketing Order

Although periodic requests have come from within the industry to establish a national milk marketing order to replace the existing system of 43 orders, there is little agreement on how such a national order would work. A national milk marketing order could range from being nearly identical to the current system to approximating a deregulated fluid milk market. This study assumes that a national order would continue differential pricing by each defined market but would provide for a single, national revenue-sharing pool as opposed to the current system of 43 order pools. This focuses the effect of establishing a national order squarely on the question of how producer revenues are distributed across regions. Such a national order would require legislation to be implemented.

[5]Effective Class I differentials, including over-order payments, would be held constant in exporting regions and would be allowed to fall in importing regions to the regional minimum Class I price plus an 11-cent over-order payment.

All producers in the national order would receive the same blend price, which would be determined by dividing total revenues in the order by the amount of milk supplied. Compared with a system of regional pools, the national pool system would generally transfer revenues from regions with higher than average Class I prices and/or use to regions with lower than average Class I prices and use. Class I differentials would primarily determine the level of revenues generated in the national order. This study sets the Class I differentials equal to their 1985 effective levels. Hence, total fluid milk revenues remain constant, allowing the regional redistribution of revenues to be examined in relative isolation.

Differences in regional blend prices would no longer signal producers or cooperatives to move milk to deficit production regions. Because of the decline in blend prices in deficit regions, even more milk would likely need to be imported. Thus, over-order payments would have to play a larger role in directing milk shipments, or shipments would have to be set administratively. This analysis assumes that shipments would take place such that transportation costs would be minimized in achieving market equilibrium without over-order payments. No analysis of administrative decisions is presented.

No Classified Pricing

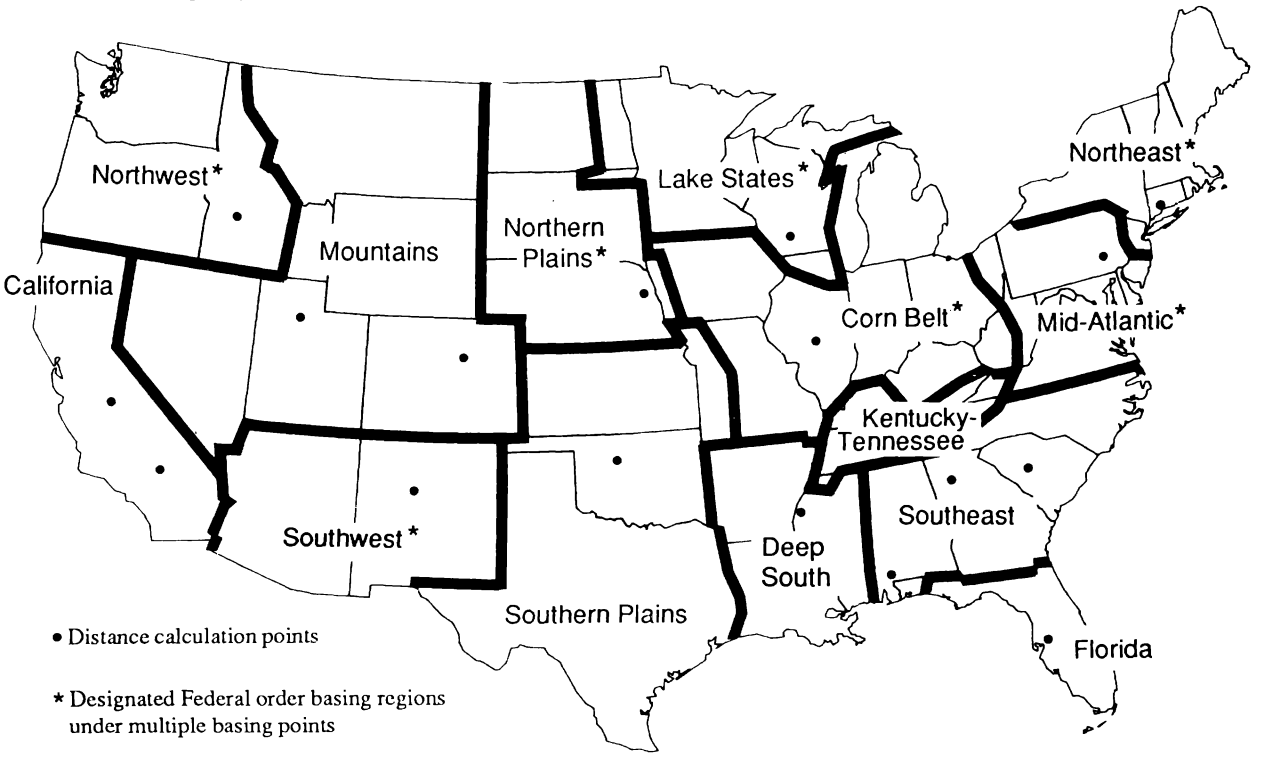
This alternative assumes that all classified pricing and pooling would be eliminated but that dairy support prices would be retained. This alternative shifts fluid milk prices from being administratively set to being market generated. All Grade A milk in a specific market would be valued the same, regardless of its use, and processors would have to pay high enough prices to cover the higher costs of producing and marketing Grade A milk used in fluid or soft manufactured products. However, there would be no extra revenues (pure price discrimination in economic terms) above actual costs. Individual processor pools, multiple processor pools, or cooperative pools for sharing revenues among producers would quite likely evolve in this setting to spread risks and stabilize local markets.

Multiple Basing Points

Under this alternative, a multiple basing point system would replace the single basing point of Eau Claire, Wisconsin (the Lake States in this study), which is used to calculate the transportation component of Class I differentials. This study assumes that six additional regions with Class I use accounting for less than 60 per-

Figure 3

Milk marketing regions



cent of their total market use would be designated as basing points and assigned the same basic minimum Class I differential.[6] The minimum Class I differentials in these seven basing points are set equal to $1.12, the 1985 differential in Minneapolis, Minnesota, the major market in the Upper Midwest basing point order. Lower prices in these additional designated basing points and their closer proximity to deficit regions would reduce interregional milk marketing costs. Thus, Class I differentials in deficit regions would equal this base differential plus the additional cost of acquiring available milk from its nearest location.

Interregional Marketing

Interregional milk marketings include both milk that is actually shipped and milk that is not shipped. Under the 1985 base, about 5 percent of Grade A milk production is marketed interregionally, while less than 3 percent is actually shipped. The reason for this difference is that Federal order regulations governing pool qualifications require that only a set minimum proportion of milk pooled (marketed) in an order actually be transported (shipped) before the seller qualifies to share in the order's revenue pool and receives its blend price. In this study, "marketings" refer to the amounts of milk that are marketed interregionally in response to regional blend price differences. "Shipments" refer to the proportion of interregional marketings that is actually transported.

The proportion of actual shipments to marketings range from 50 percent to 100 percent, depending on the region and policy alternative analyzed. The 1985 base, the reconstitution alternative under the single basing point, and the multiple basing points alternative involve classified pricing and regional revenue pools. To reflect observed differences in 1985 regional effective blend prices and provisions of individual Federal orders, this study assumes that 50 percent of Grade A milk pooled interregionally would actually be shipped, except for 65 percent into Kentucky-Tennessee and 75 percent into the Southeast and Florida. The reconstitution and multiple basing points alternatives assume the same shipping requirements as the base. When minimum shipping requirements are removed, creating an effective shipping requirement of 100 percent, interregional marketings and shipments are equal. This is the case with the no classified pricing alternative, which does away with regional revenue pools, and with the national order alternative under which interregional pooling cannot exist.

Market equilibrium is reached when effective regional blend prices free-on-board (f.o.b. plants) differ by no more than interregional marketing costs. Interregional marketing costs are a function of transportation costs and the proportion of interregionally marketed milk actually shipped. Under all alternatives except reconstitution, the average transportation cost for raw milk is assumed to be 35 cents per cwt per 100 miles. Thus, the interregional marketing costs are calculated by multiplying the respective shipping requirements times the average transportation costs.

Changes in effective regional differentials, transportation costs, and minimum shipping requirements, as reflected in blend prices, create different incentives for interregional marketing. Hence, regional blend prices and net interregional marketings reflect market equilibrium conditions, while the associated net interregional shipments indicate how much milk is actually being transported (shipped) among regions. The actual amount of milk for fluid and manufacturing uses in a given region depends on the amounts shipped.

Base Data and Model Accuracy

The actual values of 1985 base regional prices and quantities are summarized in table 3. The simulated values of the base prices and quantities are given in table 4. Simulated prices and quantities as a percentage of actual prices and quantities indicate that the model used here describes the sector as it operated in 1985 with a high degree of accuracy (table 5). Errors at the national level average less than 1 percent, while regional price and quantity errors are within 5 percent, except for the Kentucky-Tennessee blend price at 7 percent. The regional effective Class I differentials for the 1985 base and the program alternatives are shown in table 6. The differentials in the alternatives incorporate specific assumptions about marketing costs associated with over-order payments.

[6]Even though the Mountain region also had Class I use of slightly less than 60 percent, it was not designated a basing point because of geographic and marketing difficulties related to the Rocky Mountains.

Table 3--Actual levels of regional market variables, 1985 1/, 2/

Region	Supply elasticities	Quantities			Class I use	Prices 3/		Regional shares	
		Supplied	Pooled	Class I		Supply	Class I	Revenues	Expenditures
		Million pounds			Percent	Dollars per cwt		Percent	
Northeast	0.613	16,422	19,400	8,536	44	13.51	15.12	14	16
Mid-Atlantic	.508	15,358	13,102	6,373	49	13.32	14.67	13	12
Corn Belt	.469	7,304	16,706	8,164	49	13.17	14.23	14	15
Kentucky-Tennessee	.914	2,957	2,010	1,507	75	13.28	14.87	2	3
Southeast	.569	4,039	4,814	3,839	80	14.82	15.47	4	8
Florida	1.003	2,020	2,588	2,278	88	16.11	16.69	2	5
Deep South	.659	2,380	2,482	1,872	75	14.23	14.98	2	4
Lake States	.582	27,117	24,991	4,226	17	12.51	14.17	21	8
Northern Plains	.375	1,500	2,003	776	39	12.97	14.23	1	1
Southern Plains	.769	6,066	7,899	4,778	60	13.76	14.78	5	9
Mountains	.507	2,594	3,320	1,894	57	13.37	14.41	2	3
Northwest	.388	6,186	6,009	2,033	34	12.88	14.21	5	4
Southwest	1.007	2,405	2,158	1,274	59	13.66	14.71	2	2
California	.222	16,020	15,921	6,469	40	12.24	13.52	12	11
Total	NA	122,368	123,403	54,019	44	13.12	14.63	100	100

NA = Not applicable.

1/ Supply quantities, prices, and revenue shares reflect Grade A milk only.

2/ Demand elasticities for all regions are 0.085 for milk used in fluid and soft manufactured products.

3/ Prices are f.o.b. plants and are adjusted for the regional average butterfat test.

Table 4--Simulated levels of regional market variables, 1985 base 1/

Region	Quantities			Class I use	Prices		Regional shares	
	Supplied	Pooled	Class I		Supply	Class I	Revenues	Expenditures
	Million pounds			Percent	Dollars per cwt		Percent	
Northeast	16,433	19,313	8,536	44	13.38	15.12	14	16
Mid-Atlantic	15,367	12,931	6,373	49	13.22	14.67	13	12
Corn Belt	17,307	16,625	8,164	49	13.06	14.23	14	15
Kentucky-Tennessee	2,956	2,008	1,507	75	14.25	14.98	3	3

See footnotes at end of table.

Continued--

Table 4—Simulated levels of regional market variables, 1985 base 1/--continued

Region	Quantities			Class I use	Prices		Regional shares	
	Supplied	Pooled	Class I		Supply	Class I	Revenues	Expenditures
	Million pounds			Percent	Dollars per cwt		Percent	
Southeast	4,038	4,827	3,839	80	14.77	15.47	4	8
Florida	2,019	2,595	2,278	88	16.09	16.69	2	5
Deep South	2,379	2,487	1,872	75	14.19	14.98	2	4
Lake States	27,123	24,487	4,223	17	12.32	14.17	21	8
Northern Plains	1,500	1,983	776	39	12.85	14.23	1	1
Southern Plains	6,064	7,953	4,778	60	13.69	14.78	5	9
Mountains	2,593	3,275	1,894	58	13.26	14.39	2	3
Northwest	6,485	6,066	2,033	34	12.73	14.21	5	4
Southwest	2,404	2,218	1,274	57	13.54	14.71	2	2
California	16,021	15,922	6,469	41	12.24	13.52	12	11
Total	122,689	122,689	54,016	44	13.04	14.64	100	100

1/ Supply quantities, prices, and revenue shares reflect Grade A milk only.

Table 5--1985 base values as a percentage change from actual 1985 values 1/, 2/

Region	Quantities			Class I use	Prices		Regional shares	
	Supplied	Pooled	Class I		Supply	Class I	Revenues	Expenditures
	Percentage change							
Northeast	0.07	-0.45	0	0.45	-0.93	0	-0.51	-0.01
Mid-Atlantic	.06	-1.31	0	1.32	-.72	0	-.31	-.01
Corn Belt	.02	-.48	0	.49	-.80	0	-.43	-.01
Kentucky-Tennessee	-.04	-.08	0	.08	7.33	.74	7.67	.73
Southeast	-.02	.26	0	-.26	-.31	0	.02	-.01
Florida	-.04	.26	0	-.26	-.10	0	.22	-.01
Deep South	-.03	.19	0	-.19	-.25	0	.07	-.01
Lake States	.02	-2.02	-.07	1.98	-1.48	0	-1.11	-.08
Northern Plains	.01	-1.00	0	1.01	-.89	0	-.52	-.01

See footnotes at end of table.

Continued--

Table 5--1985 base values as a percentage change from actual 1985 values 1/, 2/--continued

Region	Quantities			Class I use	Prices		Regional shares	
	Supplied	Pooled	Class I		Supply	Class I	Revenues	Expenditures
				Percentage change				
Southern Plains	-.03	.69	0	-.69	-.48	0	-.16	-.01
Mountains	-.02	-1.37	0	1.38	-.79	-.14	-.46	-.15
Northwest	4.83	.94	0	-.93	-1.13	0	4.01	-.01
Southwest	-.04	2.77	0	-2.70	-.85	0	-.54	-.01
California	.01	.01	0	.62	.03	0	.39	-.01
Total	.26	-.58	-.01	.58	-.61	.02	0	0

1/ Percentage change between 1985 base values in table 4 and actual values in table 3.
2/ Supply quantities, prices, and revenue shares reflect Grade A milk only.

Table 6--Effective regional average Class I fluid differentials under alternative Federal order policies, 1985 1/

Region	1985 base	Reconstitution	National marketing order	No classified pricing 2/	Multiple basing points	Butterfat value
			Dollars per cwt			
Northeast	3.40	3.40	3.40	0.51	1.63	0.29
Mid-Atlantic	2.95	2.95	2.95	.50	1.59	.25
Corn Belt	2.51	2.51	2.51	.52	1.64	.30
Kentucky-Tennessee	3.26	2.64	3.26	1.56	2.00	.29
Southeast	3.75	3.08	3.75	2.31	2.60	.30
Florida	4.97	3.25	4.97	4.08	4.00	.12
Deep South	3.26	2.73	3.26	2.20	2.19	.12
Lake States	2.45	2.45	2.45	.54	1.66	.32
Northern Plains	2.51	2.51	2.51	.53	1.65	.31
Southern Plains	3.06	2.47	3.06	3/1.90	2.40	.18
Mountains	2.67	2.38	2.67	.50	1.95	.13
Northwest	2.49	2.49	2.49	.64	1.76	.42
Southwest	2.99	2.85	2.99	.50	1.62	.28
California	1.80	1.80	1.80	.50	1.80	.24

1/ Effective annual average Class I differentials equal the sum of the minimum Federal order differential, butterfat value, and over-order payments. At the higher support price, the differentials are added to the 1985 average M-W price (lagged 2 months) of $11.72 per cwt at 3.5-percent butterfat. At the lower support price, the M-W price is $10.61 at 3.5-percent butterfat.
2/ Market-generated differentials for Grade A milk used in fluid and soft manufactured dairy products. These differentials assume a cost of 22 cents over the M-W price to provide within-region services associated with providing Grade A milk for use in these products.
3/ The market-generated differential increases to $2.30 under the lower support price.

Source: (33).

Effects of Modifying the Federal Order System

This section describes the national and regional effects of policy changes on the dairy industry, emphasizing changes in regional Class I differentials, blend prices, producer revenues, consumer expenditures, and CCC purchases. Study results indicate that the changes in the Federal order system considered here, especially implementing a system of multiple basing points, could reduce prices to producers, marketing costs, and consumer and CCC expenditures, without jeopardizing market stability.

Changes in the order system could also redistribute revenues among regions to conform more closely with a cost-based or market-oriented system. As interregional milk marketing patterns shift in response to policy changes, regional changes in Grade A milk available for manufacturing could also substantially alter the location and structure of the manufactured dairy products industry.

Policy Alternatives in Context

The Federal order policy alternatives analyzed range from requiring more restrictive milk pricing and marketing than the 1985 base, such as under the national marketing order alternative, to less restrictive pricing and marketing, such as under the no classified pricing alternative. Results of the reconstitution and national marketing order alternatives illustrate the effects of changing a single program provision but suggest that further policy change could be needed in implementing those alternatives. The no classified pricing alternative indicates what would happen if Federal orders were to abandon classified pricing and revenue pooling in a move towards deregulation. The multiple basing points alternative is a program that captures most of the market orientation of the no classified pricing alternative while retaining the market-stabilizing Federal order pricing and policy system.

National Effects

The national effects of changing order provisions under two support price levels are presented in terms of their effects on producer revenues, consumer expenditures, and CCC purchases. Results for each policy alternative are compared with the simulated results of the Federal order single basing point system existing in 1985 (table 7).

Producer Revenues

The Federal order policies analyzed include both reducing Class I differentials and changing revenue pooling regulations. The reconstitution and national order alternatives have little effect on weighted average Grade A blend prices and revenues compared with the 1985 base. This result reflects the fact that Class I differentials change little under the reconstitution alternative and remain constant under the national order alternative. The no classified pricing alternative lowers average Grade A producer blend prices 92 cents at the higher support price and $1.76 at the lower support price, with producer revenues dropping 11 percent and 20 percent. This blend price reduction results from Class I (fluid) price declines of $2.15 and $2.99. The multiple basing points alternative reduces the Grade A blend price 40 cents at the higher support price and $1.34 at the lower support price, with producer revenues declining 5 percent and 15 percent. This reflects Class I (fluid) price declines of 99 cents and $2.08. The results imply that Federal order policies alone can significantly enhance producer income if the policies move the sector away from a cost-based and/or market-oriented system, as represented by the no classified pricing and multiple basing points alternatives.

Consumer Expenditures

Changes in effective fluid milk prices, in response to changes in Federal order minimum prices and marketing costs, are assumed to be passed directly to consumers. Consumer expenditures on fluid milk decline 0-14 percent relative to the 1985 base at the higher support price and 7-19 percent at the lower support price. Consumer expenditures under the national order alternative are unchanged, since Class I differentials are set at 1985 base levels. The reconstitution alternative yields the smallest reduction in consumer expenditures at 1 percent, increasing to 6 percent under the multiple basing points alternative and 14 percent under the no classified pricing alternative. The declines are maintained at the lower support price. These results illustrate that producer income enhancement under the order system relates directly to higher consumer prices.

Table 7--National market variables under alternative price support and Federal order policies, 1985

Item	$11.97 support price					$11.10 support price				
	1985 base	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
					Million pounds					
Production:										
Grade A	122,689	122,585	122,236	117,986	120,551	118,068	117,877	117,527	113,621	115,748
Grade B	18,345	18,345	18,345	18,345	18,345	17,611	17,611	17,611	17,611	17,611
Total	141,034	140,930	140,581	136,331	138,896	135,679	135,488	135,138	131,231	133,358
Consumption: 1/										
Fluid	54,016	54,082	54,016	54,692	54,320	54,365	54,430	54,365	54,954	54,663
Manufactured 2/	76,951	76,951	76,951	76,919	76,951	78,208	78,208	78,208	78,170	78,208
CCC removals	13,167	12,997	12,714	7,820	10,725	6,206	5,949	5,665	1,208	3,587
					Percent					
Class I use	44	44	44	46	45	46	46	46	48	47
					Dollars per cwt					
Average prices:										
Grade A 3/	13.04	13.05	13.06	12.12	12.64	12.12	12.11	12.13	11.28	11.70
Grade B	11.73	11.73	11.73	11.73	11.73	10.86	10.86	10.86	10.86	10.86
Class I	14.64	14.42	14.64	12.48	13.65	13.53	13.31	13.53	11.65	12.56
Class II	11.87	12.06	11.86	11.88	11.86	10.99	11.14	10.98	11.03	10.98
M-W	11.76	11.76	11.76	11.76	11.76	10.89	10.89	10.89	10.89	10.89
					Million dollars					
Revenues:										
Grade A	15,996	15,998	15,965	14,303	15,242	14,307	14,279	14,251	12,814	13,544
Grade B	2,152	2,152	2,152	2,152	2,152	1,913	1,913	1,913	1,913	1,913
Expenditures:										
Fluid	7,906	7,796	7,906	6,827	7,416	7,354	7,242	7,354	6,401	6,867
Manufactured 4/	9,125	9,255	9,118	9,122	9,116	8,581	8,675	8,574	8,595	8,572
CCC expenditures 5/	1,548	1,528	1,495	920	1,261	676	648	617	132	391

1/ Reflects a net reduction in commercial stocks of 300 million pounds and net imports of 2,800 million pounds.

2/ Consumption of soft manufactured products is an estimated 11,682 million pounds at the $11.97 support price and 11,756 million pounds at the $11.10 support price.

3/ This Grade A blend price is net of interregional marketing costs averaged over total Grade A milk production.

4/ Based on weighted average of Class II and M-W prices.

5/ Based on the M-W price for manufacturing milk, which is a proxy for the effective support price in the model. The M-W price is also assumed to be the national average price for milk in hard product use.

CCC Purchases

Federal order policies interact with support prices to influence the amounts of milk produced regionally and nationally, commercial use of milk in fluid and manufactured dairy products, and CCC purchases. At a given support price, higher Class I differentials raise blend prices, encourage more production, lower commercial use, and raise CCC purchases. Reducing Class I differentials lowers CCC purchases, a result illustrated by the no classified pricing and multiple basing points alternatives. Average CCC purchases at the higher support price fall about 2.5 billion pounds for each dollar reduction in the weighted average Class I differential.

At the higher support price, CCC removals range from 13.2 billion pounds under the 1985 base to as low as 7.8 billion pounds under the no classified pricing alternative. At the lower support price, CCC removals range from 6.2 billion pounds under the support price cut alone to 1.2 billion pounds under the no classified pricing alternative. The reconstitution and national order alternatives have virtually no effect on CCC removals because national revenues to producers do not change significantly under either alternative. The multiple basing points alternative generates removals of 10.7 billion pounds and 3.6 billion pounds at the high and low support prices.

Regional Effects

The regional effects on producers and consumers of changing order provisions can vary considerably from the national effects. The effects of reducing Class I differentials and changing pooling regulations and transportation costs are very different across regions (tables 6, 8, and 9). Consumer expenditure changes are traced directly to declines in Class I differentials. Regional changes in producer revenues differ under all the alternatives, with differences related to the magnitude of the change in Class I differentials, Class I use, and the specific program provision changed. The effects on regional blend prices and revenues from reducing the support price alone are relatively uniform.

The regional results focus primarily on the five largest production regions and the three traditional southern deficit regions. The major production regions, accounting for 75 percent of Grade A production and producer revenues, are the Lake States, Corn Belt, Northeast, Mid-Atlantic region, and California. Each of these regions' Grade A production significantly exceeds its fluid use, suggesting that these regions could serve as major suppliers to fluid deficit markets. The traditional southern deficit markets, characterized by their relatively high Class I use and need to import milk in times of shortage, are the Southeast, Florida, and the Deep South.

Producer Revenues

Blend prices are positively related to both Class I differentials and use. Therefore, regions with relatively high Class I differentials and use have greater potential for blend price declines from a given Class I differential reduction. Regions included in this category are Kentucky-Tennessee, the Southeast, Florida, and the Deep South. The effect on Grade A revenues of a given blend price change is greater in regions with greater supply elasticities (see table 3). The greater the supply response to price change (supply elasticity), the more production and revenue change. Therefore, Kentucky-Tennessee, Florida, and the Southwest, with relatively high price elasticities, tend to lose more in producer revenues under a given blend price decline. The other major factors affecting regional revenues are changes in the distribution of pooled revenues resulting from the lower transportation costs under reconstitution and from the shift to a national revenue pool. Regions with relatively low Class I differentials and use, such as the Lake States, Northern Plains, and Corn Belt, tend to gain under these provisions.

Under 1985 conditions, changes in producer revenues among the five largest production regions reveal the widely varying effects of policy changes. Changes in regional revenues range from a 10-percent increase to a 17-percent decrease (table 9). Producers in deficit regions lose revenues under all alternatives due to reduced differentials under the reconstitution, multiple basing points, and no classified pricing alternatives and to nationally sharing revenues under the national pool alternative.

Although revenues under the reconstitution and national marketing order alternatives are virtually unchanged at the national level, they are redistributed regionally in favor of the Lake States and California. Under the no classified pricing alternative, national producer revenues fall about 11 percent. Producers in the Lake States, Florida, the Deep South, and Southern Plains fare best under this alternative, indicating that they benefit the least under the Federal order system existing in 1985. Revenue declines in California are consistent with this group, as would be expected since its Class I differential is lower than any existing in the Federal order system. Producers in the Northeast, the Mid-Atlantic region, the Corn Belt, Kentucky-Tennessee, and the Southwest incur the largest revenue declines, indicating that they benefit the most under 1985 marketing conditions. Revenue losses under the multiple basing points alternative are about half those

under the no classified pricing alternative and are distributed more evenly among regions. The Northeast, Mid-Atlantic region, Southwest, and southern deficit regions lose relatively more than other regions under this alternative.

Reconstitution. Producers in the Lake States clearly gain as reduced transportation costs enhance their ability to export milk and increase revenues 5 percent, reflecting a blend price increase of 42 cents. Gains for producers in California are about half this amount. Lower transportation costs result in greater exports from these two regions. Revenues in the other major production regions change 1 percent or less. Revenues in the southern deficit regions decline 9-21 percent. Blend price declines in the deficit regions range from 74 cents in the Deep South to $1.78 in Florida as lower transportation costs under reconstitution allow other region with lower production costs to expand exports to deficit regions.

National Marketing Order. National revenue pooling significantly shifts revenues from regions with a combination of high Class I differentials and/or Class I use to regions with low Class I differentials and use. Revenues drop 15-36 percent in the southern deficit regions, reflecting blend price declines ranging from $1.29 in the Deep South to $3.19 in Florida. Producer

Table 8--Changes in regional Grade A producer blend prices under alternative price support and Federal order policies, 1985 1/

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
	Dollars per cwt	Change in dollars per cwt								
Northeast	13.38	0.06	-0.31	-1.46	-0.65	-0.91	-0.86	-1.25	-2.33	-1.62
Mid-Atlantic	13.22	.08	-.19	-1.36	-.76	-.91	-.84	-1.13	-2.22	-1.71
Corn Belt	13.06	-.04	.02	-1.14	-.41	-.91	-.98	-.92	-2.00	-1.35
Kentucky-Tennessee	14.25	-.89	-1.18	-1.21	-.91	-.92	-1.83	-2.12	-2.08	-1.86
Southeast	14.77	-1.13	-1.69	-.98	-.87	-.92	-2.07	-2.63	-1.85	-1.81
Florida	16.09	-1.78	-3.19	-.53	-.86	-.92	-2.72	-4.13	-1.40	-1.81
Deep South	14.19	-.74	-1.29	-.51	-.69	-.92	-1.69	-2.23	-1.38	-1.63
Lake States	12.32	.42	.78	-.48	-.16	-.91	-.52	-.16	-1.35	-1.06
Northern Plains	12.85	.26	.24	-.92	-.09	-.91	-.68	-.70	-1.76	-1.06
Southern Plains	13.69	-.12	-.73	-.32	-.03	-.92	-1.07	-1.67	-.78	-1.00
Mountains	13.26	-.20	-.35	-1.31	-.23	-.92	-1.14	-1.29	-2.17	-1.17
Northwest	12.73	.05	.47	-.75	-.26	-.92	-.89	-.47	-1.62	-1.20
Southwest	13.54	-.37	-.48	-1.63	-.81	-.92	-1.31	-1.42	-2.48	-1.76
California	12.24	.22	.78	-.58	0	-.95	-.72	-.16	-1.44	-.95
Market average	13.04	.01	.02	-.92	-.39	-.92	-.92	-.91	-1.76	-1.34

1/ Annual average Grade A blend prices, f.o.b. plants, include over-order payments and are adjusted for regional average butterfat test.

Source: Appendix table 1.

revenues in the major production regions fall 4 percent or less in the Northeast and Mid-Atlantic region and rise 8 percent and 10 percent in California and the Lake States.

No Classified Pricing. Removing classified pricing and retaining price supports reduce producer revenues 7 percent or less in California, the Southern Plains, Lake States, Deep South, and Florida, and up to 23 percent in the Southwest. Among the five large production regions, producers in California and the Lake States fare best, losing only about 6 percent each in revenues and 58 cents and 48 cents in blend prices. The Northeast slips the most, with its blend price falling $1.46 and revenues dropping about 17 percent. Revenues in the Mid-Atlantic region fall 15 percent, while the blend price drops $1.36. Revenues and the blend price in the Corn Belt fall 13 percent and $1.14. These results indicate that the Federal milk marketing order system in 1985 both increased and redistributed producer revenues, particularly to the Northeast, Mid-Atlantic region, and Corn Belt, among the major production regions. Conversely, the smaller declines in California, the Deep South, Florida, and the Southern Plains indicate that existing regulated prices in these regions are relatively closer to those that competitive market forces would generate.

The results of the no classified pricing alternative are based on producer price responses generated under an environment of reduced market risk and uncertainty that Federal orders provide. However, price variability and market uncertainty facing producers would probably be greater in the absence of minimum classified pricing and revenue pooling under Federal orders. Because the actual response of producers is not known,

Table 9--Changes in regional Grade A producer revenues under alternative price support and Federal order policies, 1985 1/

Region	1985 base	$11.97 support price: Reconstitution	$11.97 support price: National marketing order	$11.97 support price: No classified pricing	$11.97 support price: Multiple basing points	$11.10 support price: Support price cut alone	$11.10 support price: Reconstitution	$11.10 support price: National marketing order	$11.10 support price: No classified pricing	$11.10 support price: Multiple basing points
	Million dollars	Percentage change								
Northeast	2,199	1	-4	-17	-8	-11	-10	-15	-27	-19
Mid-Atlantic	2,032	1	-2	-15	-9	-10	-9	-13	-24	-19
Corn Belt	2,261	0	0	-13	-5	-10	-11	-10	-22	-15
Kentucky-Tennessee	421	-12	-15	-16	-12	-12	-23	-27	-26	-23
Southeast	597	-12	-17	-10	-9	-10	-21	-26	-19	-19
Florida	325	-21	-36	-7	-10	-11	-31	-45	-17	-21
Deep South	338	-9	-15	-6	-8	-11	-19	-25	-16	-18
Lake States	3,343	5	10	-6	-2	-11	-7	-2	-17	-13
Northern Plains	193	3	3	-10	-1	-10	-7	-7	-18	-11
Southern Plains	830	-2	-9	-4	0	-12	-13	-21	-10	-13
Mountains	344	-2	-4	-15	-3	-10	-13	-14	-24	-13
Northwest	826	1	5	-8	-3	-10	-10	-5	-17	-13
Southwest	326	-5	-7	-23	-12	-13	-18	-20	-33	-24
California	1,962	2	8	-6	0	-9	-7	-2	-14	-9
Total	15,996	0	0	-11	-5	-11	-11	-11	-20	-15

1/ Computed with annual average Grade A blend prices, f.o.b. plants, include over-order payments and are adjusted for the regional average butterfat test.

the no classified pricing alternative assumes that milk production response would be the same for a given average price change as that for classified pricing. In this more uncertain and risky environment, milk production at a given average price would likely be reduced, while producer blend prices and revenues would likely be higher than the study results show. These higher milk prices would also reduce the benefits to consumers from what the results show (see Appendix I).

Multiple Basing Points. Establishing six additional Federal order basing points (for a total of seven) (see fig. 3) reduces revenues and prices by nearly half the amount as under the no classified pricing alternative. Revenue losses in the major production regions range between 2 percent in the Lake States and 9 percent in the Mid-Atlantic region, reflecting blend price declines of 16-76 cents. Revenues in southern deficit regions drop 8-10 percent, and blend prices decline 69-87 cents. The Southwest fares similarly as it becomes a basing point. California revenues and blend price remain unchanged as California is assumed to remain outside of the Federal order system under this alternative as under the 1985 base. The multiple basing points alternative provides even less price incentive for California producers to come under the Federal order system.

Support Price Cut. Cutting the support price while maintaining 1985 Federal order regulations and Class I differentials (1985 base) results in a relatively uniform 91- to 95-cent reduction in blend prices in each region. Regional revenues fall 9-13 percent. The combined results of Federal order changes and the support price reduction can be approximated by adding the results of the respective changes.

Consumer Expenditures

Changes in Class I differentials translate directly into changes in prices paid by processors and, in turn, by consumers. Changes in the support price and Class I differentials can be summed to obtain changes in fluid milk prices. The inelastic nature of fluid milk demand (relatively small changes in fluid milk consumed in response to lower prices) also works to translate lower consumer prices almost directly into lower consumer expenditures (table 10).

Consumer expenditures on fluid milk drop 14 percent under the no classified pricing alternative and 6 percent under the multiple basing points alternative. The reconstitution alternative reduces expenditures 1 percent at the national level, with regional reductions of 3-10 percent concentrated in the southern deficit regions. The results indicate that the existing Federal order system could be modified to provide savings to consumers. A multiple basing points system, as defined here, would provide greater and more widely distributed savings to consumers than would a system that facilitates reconstitution without lowering minimum Class I differentials consistently with reductions in transportation costs.

Reconstitution. With the removal of disincentives to reconstitution, all interregional shipments are moved in concentrated form, thereby reducing transportation costs by half. As a result, effective Class I differentials fall in the southern deficit regions, Southern Plains, Southwest, and Mountains (see table 6). These reductions are attributed to the reduced costs of imported milk, generating a 4-percent drop in consumer expenditures in Kentucky-Tennessee, the Southeast, Deep South, and Southern Plains. Expenditures decline 10 percent in Florida. Retaining the structure of minimum Class I prices existing in 1985 limits the decline in Class I prices in importing regions that reconstitution could generate.

National Marketing Order. Class I differentials are held constant in this alternative, and therefore, fluid milk expenditures do not change.

No Classified Pricing. Eliminating classified pricing reduces consumer expenditures 6-10 percent in the southern deficit regions compared with 10 percent in California and 14-19 percent in the major production regions. These results indicate that 1985 differentials in southern deficit regions and California were closer to the levels actually needed to attract sufficient fluid milk to meet local demand than those in other regions. However, results under this alternative need to be interpreted carefully. If eliminating classified pricing were to increase market risk and uncertainty, prices would be higher and the magnitude of changes in consumer expenditures would be smaller than study results indicate.

Multiple Basing Points. This policy alternative reduces Class I prices in all regions, except California. Establishing multiple basing points under Federal orders would provide no more incentive for California to become regulated by the Federal order system than under the 1985 base. Therefore, this study treats California the same under this alternative as it does under the 1985 base. Reductions in consumer expenditures in the four major production regions east of the Rockies range from 5 percent in the Lake States to 11 percent in the Northeast. Expenditures in southern deficit regions drop 5-7 percent, roughly the same as under the no classified pricing alternative. In other

regions, reductions are no more than half as much as those under the no classified pricing alternative.

Support Price Cut. Cutting the support price alone reduces fluid milk expenditures about 7 percent in all regions. The support price cut combined with the no classified pricing alternative reduces consumer expenditures about 20 percent in the major production regions and 11-17 percent in the southern deficit regions and California.

Interregional Marketing

Marketings from the Lake States and Corn Belt to the southern deficit regions and the Southern Plains dominate the 1985 base marketing pattern. Marketings from the Mid-Atlantic region to the Northeast is another major pattern. These regions are particularly sensitive to policy change. Interregional marketing reaches equilibrium when effective regional blend prices differ by no more than interregional marketing costs. Interregional marketing patterns are determined by regional Grade A milk supplies and fluid milk demand, Federal order effective class prices and pooling provisions, and interregional marketing costs. Alternatives that modify any of these factors would result in different interregional marketings and regional revenue distributions.

Annual interregional marketings are shown in table 11. However, not all milk marketed interregionally is shipped. Actual net interregional shipments are shown in table 12. These shipments are derived by multiplying interregional marketings by the shipping proportions (for greater detail, see "Federal Order Alternatives and Economic Framework" and Appendix I). Interregional

Table 10--Changes in regional consumer expenditures for fluid milk under alternative price support and Federal order policies, 1985 1/

Region	1985 base	$11.97 support price: Reconstitution	$11.97 support price: National marketing order	$11.97 support price: No classified pricing	$11.97 support price: Multiple basing points	$11.10 support price: Support price cut alone	$11.10 support price: Reconstitution	$11.10 support price: National marketing order	$11.10 support price: No classified pricing	$11.10 support price: Multiple basing points
	Million dollars	Percentage change								
Northeast	1,291	0	0	-19	-11	-7	-7	-7	-25	-18
Mid-Atlantic	935	0	0	-17	-9	-7	-7	-7	-23	-16
Corn Belt	1,162	0	0	-15	-6	-7	-7	-7	-20	-12
Kentucky-Tennessee	226	-4	0	-12	-8	-7	-11	-7	-17	-14
Southeast	594	-4	0	-10	-7	-7	-11	-7	-15	-13
Florida	380	-10	0	-6	-5	-6	-16	-6	-11	-11
Deep South	280	-3	0	-8	-7	-7	-10	-7	-13	-14
Lake States	598	0	0	-14	-5	-7	-7	-7	-20	-12
Northern Plains	110	0	0	-14	-6	-7	-7	-7	-20	-13
Southern Plains	706	-4	0	-9	-4	-7	-11	-7	-12	-11
Mountains	273	-2	0	-16	-5	-7	-9	-7	-21	-12
Northwest	289	0	0	-14	-5	-7	-7	-7	-19	-12
Southwest	187	-1	0	-17	-9	-7	-8	-7	-23	-16
California	875	0	0	-11	0	-8	-8	-8	-17	-8
Total	7,906	-1	0	-14	-6	-7	-8	-7	-19	-13

1/ Computed with annual average Class I or fluid milk prices, f.o.b. plants, not including processing or distributing costs.

shipments rise by about a third under the reconstitution alternative and fall by at least half under the national order, no classified pricing, and multiple basing points alternatives. This indicates that the single basing point system under the 1985 base and the reconstitution alternative provide economic incentives for more milk to be shipped than needed to meet regional milk uses in fluid and soft manufactured dairy products.

1985 Base

Interregional marketings under the 1985 base are about 7.4 billion pounds, of which about 4.0 billion pounds were actually shipped. The 1985 base marketing pattern is dominated by interregional marketings from the Lake States, the Corn Belt, and Kentucky-Tennessee to the Southern Plains and southern deficit regions, and from the Mid-Atlantic region to the Northeast, primarily from Pennsylvania to New York. This marketing pattern reflects the single basing point system, which progressively increases minimum Class I prices east of the Rockies with increasing distance from the Lake States.

Reconstitution

This alternative results in a marketing pattern much like the 1985 base but with larger volumes marketed interregionally. The reconstitution alternative assumes that average transportation costs are reduced 50 percent to 17.5 cents per 100 miles and that a fixed cost of 35 cents per cwt is added for concentrating and recombining the milk. Reduced transportation costs enhance incentives to export.

Interregional marketings increase 16 percent, while shipments increase 31 percent. Imports into the southern deficit regions triple. Exports from the Lake

Table 11--Net interregional marketings under alternative price support and Federal order policies 1/

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
	Million pounds 2/									
Northeast	-2,880	-2,015	0	0	0	-2,692	-1,980	0	0	0
Mid-Atlantic	2,435	3,143	0	0	0	2,578	3,179	0	0	0
Corn Belt	682	0	190	1,014	747	1,238	0	815	1,586	1,208
Kentucky-Tennessee	948	116	1,058	863	817	878	59	868	687	617
Southeast	-789	-2,808	-493	-977	-832	-715	-2,705	-675	-1,141	-1,014
Florida	-576	-1,108	-911	-878	-703	-610	-1,101	-1,043	-1,000	-832
Deep South	-107	-720	156	-22	-28	-92	-698	35	-132	21
Lake States	2,635	4,150	0	0	0	1,585	3,887	0	0	0
Northern Plains	-482	-14	0	0	116	-403	5	0	176	134
Southern Plains	-1,889	-744	0	0	-116	-1,805	-647	0	-176	-134
Mountains	-682	-793	0	-24	-245	-611	-724	0	-24	-148
Northwest	419	793	0	-32	189	419	724	0	-32	92
Southwest	186	-418	0	-43	-43	129	-489	0	-43	-43
California	99	418	0	99	99	99	489	0	99	99
Total marketings	7,405	8,620	1,404	1,976	1,967	6,928	8,344	1,718	2,548	2,171

1/ Annual net interregional marketings of Grade A milk in fresh form.
2/ Negative signs indicate net imports.

States rise just over 50 percent, displacing nearly all exports from the Corn Belt and Kentucky-Tennessee. Exports from the Mid-Atlantic region increase about 30 percent and go to the Northeast and Southeast. California emerges as an exporter to the Southwest. However, California's exports are of a much smaller magnitude, approximately 10 percent of the exports from the Lake States.

Reconstitution is assumed to take place with minimum Class I differentials held at 1985 levels. This implies that the adjustment of blend prices to a new equilibrium must rely more on interregional marketings than would be necessary if Class I prices were allowed to fall further. As interregional marketings increase, Class I use and blend prices increase in exporting regions and decline in importing regions. Interregional marketings increase until regional blend prices are aligned by the new interregional marketing costs. Thus, interregional marketings are greater than would be the case if minimum Class I differentials in importing regions were allowed to fall along with the transportation cost reduction. This issue is revisited in "Further Considerations." The additional analysis restricts interregional marketings by maintaining regional Class II use at 1985 base levels to recognize that the demands for milk by the manufacturing industry would likely limit interregional marketings to lower levels.

National Marketing Order

Under the national marketing order, alternative regional pooling requirements no longer apply; all producers are automatically included in a single pool. Milk is assumed to be transported interregionally when required to meet fluid needs plus operating reserves of 10 percent of Class I use. The interregional marketing costs are 35 cents per cwt per 100 miles. Interregional ship-

Table 12--Net interregional shipments under alternative price support and Federal order policies 1/

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
					Million pounds					
Northeast	-1,440	-1,007	0	0	0	-1,346	-990	0	0	0
Mid-Atlantic	1,217	1,854	0	0	0	1,290	1,890	0	0	0
Corn Belt	404	400	190	1,014	479	686	382	530	1,011	796
Kentucky-Tennessee	753	354	1,058	863	685	703	299	734	661	586
Southeast	-592	-2,105	-493	-977	-625	-536	-2,029	-506	-855	-759
Florida	-432	-831	-911	-878	-530	-458	-825	-782	-750	-623
Deep South	-53	-360	156	-22	-10	-46	-349	26	-66	0
Lake States	1,318	2,075	0	0	0	793	1,943	0	0	0
Northern Plains	-241	-7	0	0	58	-201	3	0	88	67
Southern Plains	-945	-372	0	0	-59	-903	-323	0	-88	-67
Mountains	-341	-396	0	-24	-121	-305	-362	0	-12	-74
Northwest	209	396	0	-32	94	209	362	0	-16	46
Southwest	93	-209	0	-43	-21	64	-245	0	-22	-22
California	50	209	0	99	51	49	244	0	50	49
Total shipments	4,043	5,288	1,404	1,976	1,366	3,490	5,123	1,289	1,787	1,544

1/ Annual net interregional shipments are the actual quantities of milk transported between regions (interregional marketings adjusted for shipping requirements).

ments are made to minimize total transportation costs. Interregional marketings decline 80 percent, while shipments decline 65 percent, with shipments equaling marketings. The only importing regions under this alternative are the Southeast and Florida, with Kentucky-Tennessee providing 75 percent of the total and the Corn Belt providing the rest. Because regional blend prices are the same in all regions, these prices provide no economic incentive to market milk into deficit regions. Interregional shipments would need to be made with administrative direction or with greater reliance on over-order payments. Consideration of factors other than transportation costs, such as costs to manufacturers of giving up milk, would require shipments from greater distances and at greater costs.

No Classified Pricing

This alternative removes the incentive to interregionally market milk beyond the amounts demanded for fluid and soft manufactured products. Therefore, this study assumes that all milk must be shipped into a region for its producers to be paid the regional price. Thus, interregional marketing costs are 35 cents per cwt per 100 miles.

Interregional marketings decline 73 percent, and shipments decline 50 percent, with shipments equaling marketings. Marketings to the southern deficit regions increase about 28 percent and come completely from the Corn Belt and Kentucky-Tennessee. Exports from the Lake States and Mid-Atlantic region and imports into the Northeast and Southern Plains fall to zero.

Multiple Basing Points

By establishing multiple basing points, Class I differentials rise from the minimum to no more than is necessary to provide deficit regions with adequate fluid milk supplies. The incentives to interregionally market milk into regions without fluid deficits are eliminated or markedly reduced. Therefore, the marketing pattern under the multiple basing points alternative is similar to that generated under the no classified pricing alternative.

Interregional marketings decline 73 percent, and shipments decline 65 percent. Shipments as a percentage of marketings increase to 69 percent compared with 55 percent under the base. Establishing the Corn Belt and Northern Plains as basing points eliminates the demand for exports from the Lake States. The Corn Belt and Kentucky-Tennessee export to the southern deficit regions. Imports into the Southern Plains decline 94 percent. Marketings from the Mid-Atlantic region to the Northeast fall to zero as both regions are established as basing points.

Support Price Cut

Marketing patterns for each Federal order alternative remain virtually the same at the two support price levels. Because the entire dairy price structure falls as the support price falls, regional blend price differences remain relatively constant. Thus, the lower support price does not significantly alter interregional marketing patterns.

Regional Milk Available for Manufacturing

Changing order provisions and support price levels affects the supply and location of milk available for manufacturing and, in turn, the location and structure of the manufactured dairy products industry. The policy changes analyzed affect regional Grade A and fluid milk prices, regional Grade A and Grade B milk production, regional fluid use, and quantities of milk marketed and shipped interregionally. Thus, the amount of milk available for manufacturing cheese, butter, and nonfat dry milk in each region depends heavily on the policies in effect.

The changes in regional supplies available for manufacturing are presented in table 13; percentage changes are given in table 14. The amount of milk available for manufacturing in each region is equal to regional Grade B production plus the amount of Grade A milk in a region minus fluid use. The amount of Grade A milk actually processed or manufactured in a region is equal to the amount produced plus the shipments imported and/or exported. Because the southern deficit regions have very little capacity for hard product manufacturing (Florida has none), they are grouped together in the analysis of milk available for manufacturing use.

Manufacturing supplies change under all the policy alternatives. Reconstitution under the single basing point system could substantially reduce milk available for cheese, nonfat dry milk, and butter in the Southern Plains, Mid-Atlantic region, and Northeast. A national order and revenue pool would increase manufacturing milk in all major manufacturing regions, except the Northeast. Multiple basing points, like no classified pricing, would significantly reduce manufacturing milk in the Northeast and increase supplies in the Lake States and Mid-Atlantic region.

These changes have serious implications for the manufacturing industry. Large increases in the amount

of milk pooled in a region could require an increase in plant capacity for manufacturing milk into dairy products or the transport of excess milk out of the region to plants with available manufacturing capacity. Large decreases in available manufacturing milk in a region would reduce use of existing plant capacity and raise average manufacturing costs, creating pressures to reduce plant capacity.

Reconstitution

The reconstitution alternative increases milk shipments and reduces milk available for manufacturing into cheese, butter, and powder in major exporting areas, including the Lake States and Mid-Atlantic region. The large increases in manufacturing milk supplies in importing regions indicate that the 1985 minimum Class I prices in importing regions are higher than necessary to meet fluid milk demands. The implications of this policy are analyzed in "Further Considerations."

Available manufacturing milk under the reconstitution alternative is unchanged, but regional shifts are substantial. Lowering the cost of transporting milk produces significant incentives to raise the volume of milk marketed interregionally. Maintaining the single basing point system ensures that the marketing pattern is not altered significantly. Manufacturing milk in the two major exporting regions, the Lake States and the Mid-Atlantic region, declines 1 percent and 7 percent.

Allowing effective Class I prices to fall no further than the Federal order minimum levels of 1985 plus an 11-cent regional fluid marketing cost provides incentives to export more milk into deficit regions than is needed for fluid consumption. Manufacturing milk rises 1.7 billion pounds in the southern deficit regions, roughly double the 1985 base. The effective Class I price in the Northeast, including an 11-cent over-order payment, remains an incentive for imports (through the blend price), and manufacturing milk falls only 4 percent.

Table 13--Actual changes in regional Grade A and Grade B milk available for manufacturing, 1985

Region	1985 base	$11.97 support price: Reconstitution	$11.97 support price: National marketing order	$11.97 support price: No classified pricing	$11.97 support price: Multiple basing points	$11.10 support price: Support price cut alone	$11.10 support price: Reconstitution	$11.10 support price: National marketing order	$11.10 support price: No classified pricing	$11.10 support price: Multiple basing points
					Million pounds					
Northeast	9,337	-387	-1,677	-2,716	-2,019	-839	-1,156	-2,451	-3,447	-2,825
Mid-Atlantic	8,210	-593	1,102	295	710	-675	-1,235	478	-301	66
Corn Belt	11,618	-23	224	-1,444	-375	-1,014	-760	-866	-2160	-1,458
Kentucky-Tennessee	1,044	224	-531	-358	-116	-160	66	-419	-354	-231
Southeast	865	1,321	-368	194	-128	-228	1,064	-538	-90	-170
Florida	173	155	78	366	-22	-103	18	-182	119	-58
Deep South	639	218	-355	-102	-130	-126	84	-349	-169	-267
Subtotal	1,676	1,694	-645	458	-280	-458	1,166	-1,068	-141	-495
Lake States	32,554	-226	2,300	642	1,095	-1,159	-1,807	609	-1,006	-583
Northern Plains	2,301	-222	-231	-292	-306	-124	-318	-316	-463	-404
Southern Plains	2,488	-632	-1,196	-1,091	-915	-405	-1,050	-1,567	-1,192	-1,286
Mountains	1,309	32	-376	-477	-250	-151	-120	-495	-601	-416
Northwest	5,274	-177	301	65	55	-231	-377	71	-174	-134
Southwest	1,037	235	7	-175	-41	-145	95	-169	-356	-218
California	10,171	-97	270	-284	-2	-341	-465	-53	-548	-341
Total	87,017	170	-452	-5,378	-2,442	-5,702	-5,960	-6,246	-10,741	-8,325

Manufacturing milk in the Southern Plains falls 25 percent (632 million pounds), primarily because imported marketings drop 1.1 billion pounds in response to the lower effective Class I price and blend price.

National Marketing Order

A national milk marketing order increases production in major milk manufacturing regions and reduces production in deficit regions. Manufacturing milk in the Lake States and Mid-Atlantic region, in particular, rises due to the loss of pricing incentives to market milk interregionally.

National milk available for manufacturing falls 1 percent but regionally shifts as a result of producers in all regions receiving the same blend price. Blend prices and production generally increase where regional Class I use is below average and vice versa; the Corn Belt is a borderline exception. Furthermore, equalizing prices removes any incentive to interregionally market milk. Blend prices rise in the Lake States, the Northwest, and California, raising production without an incentive to market the milk interregionally. Thus, available manufacturing milk rises 7 percent (2.3 billion pounds) in the Lake States, 6 percent in the Northwest, and 3 percent in California.

The opposite is true in Kentucky-Tennessee and the southern deficit regions, where Class I use increases and blend prices fall under the national pool. Manufacturing milk in Kentucky-Tennessee declines 0.5 billion pounds (51 percent) as the region becomes the primary exporter to southern deficit regions, where manufacturing milk is reduced similarly. Given the negative effect of reduced blend prices on production and the ability to import, manufacturing milk falls 1.7 billion pounds (18 percent) in the Northeast and 1.2 bil-

Table 14--Percentage change in regional Grade A and Grade B milk available for manufacturing, 1985

Region	1985 base	$11.97 support price: Reconstitution	$11.97 support price: National marketing order	$11.97 support price: No classified pricing	$11.97 support price: Multiple basing points	$11.10 support price: Support price cut alone	$11.10 support price: Reconstitution	$11.10 support price: National marketing order	$11.10 support price: No classified pricing	$11.10 support price: Multiple basing points
	Million pounds					Percent				
Northeast	9,337	-4	-18	-29	-22	-9	-12	-26	-37	-30
Mid-Atlantic	8,210	-7	13	4	9	-8	-15	6	-4	1
Corn Belt	11,618	0	2	-12	-3	-9	-7	-7	-19	-13
Kentucky-Tennessee	1,044	21	-51	-34	-11	-15	6	-40	-34	-22
Southeast	865	153	-43	22	15	-26	123	-62	-10	20
Florida	173	90	45	212	-13	-60	10	-105	69	-33
Deep South	639	34	-56	-16	-19	-20	13	-55	-27	-42
Subtotal	1,677	101	-39	27	-17	-27	70	-64	-8	-30
Lake States	32,554	-1	7	2	3	-4	-6	2	-3	-2
Northern Plains	2,301	-10	-10	-13	-13	-5	-14	-14	-20	-18
Southern Plains	2,488	-25	-48	-44	-37	-16	-42	-63	-48	-52
Mountains	1,309	2	-29	-36	-19	-12	-9	-38	-46	-32
Northwest	5,274	-3	6	1	1	-4	-7	1	-3	-3
Southwest	1,037	23	1	-17	-4	-14	9	-16	-34	-21
California	10,171	-1	3	-3	0	-3	-5	1	-5	-3
Total	87,017	0	-1	-6	-3	-7	-7	-7	-12	-10

Source: Table 13.

lion pounds (48 percent) in the Southern Plains. Available manufacturing milk in the Mid-Atlantic region rises 1.1 billion pounds (13 percent), primarily as a result of reduced exports.

No Classified Pricing

This alternative removes the incentive to interregionally pool milk beyond the amounts demanded for use in fluid and soft manufactured products, thereby shifting marketing patterns and changing the supplies of milk available for manufacturing. Available manufacturing milk falls 5.3 billion pounds (6 percent). Manufacturing milk increases in the Lake States and Mid-Atlantic region and dramatically declines in the Northeast, Corn Belt, and Southern Plains.

The Lake States and Mid-Atlantic region no longer export, and manufacturing milk supplies in these regions increase 0.6 billion pounds (2 percent) and 0.3 billion pounds (4 percent). The Corn Belt and Kentucky-Tennessee become major exporters to southern deficit regions. Thus, manufacturing milk in the Corn Belt and Kentucky-Tennessee falls 1.4 billion pounds (12 percent) and 0.4 billion pounds (34 percent). Manufacturing milk in the Northeast and Southern Plains, which no longer import, drops 2.7 billion pounds (29 percent) and 1.1 billion pounds (44 percent).

Multiple Basing Points

Available manufacturing milk under the multiple basing points alternative takes on a pattern similar to that under the no classified pricing alternative. Manufacturing milk nationally declines 2.4 billion pounds (3 percent), less than half the amount under the no classified pricing alternative but substantially more than under the other alternatives. Manufacturing milk rises in the Lake States and Mid-Atlantic region and falls in the Northeast, Corn Belt, and Southern Plains.

Support Price Cut

Both Grade A and Grade B milk production decline in response to a support price cut. Therefore, manufacturing milk in regions with substantial Grade B milk production falls relatively more than that in regions with little or no Grade B milk production. In contrast, Federal order policy changes affect only Grade A milk production. The lower support price alone reduces manufacturing milk 5.7 billion pounds (7 percent). Manufacturing milk in the Lake States and Corn Belt fall the most at about 1 billion pounds each. Closely following are the Northeast and Mid-Atlantic region, with declines of 839 million pounds and 675 million pounds. These reductions represent 4 percent in the Lake States and 8-9 percent in the other regions. Manufacturing milk in the southern deficit regions and Southern Plains falls 458 million pounds (27 percent) and 405 million pounds (16 percent).

Combined Effects of Federal Order Changes and Support Price Cuts

A support price cut combined with changes in classified pricing and revenue pooling substantially affects regions with important manufacturing industries. The support price cut reduces manufacturing milk by 6.0 billion pounds with reconstitution, 6.2 billion pounds with the national marketing order, 10.7 billion pounds with no classified pricing, and 8.3 billion pounds with multiple basing points. Regional declines in manufacturing milk under the support price reduction and changes in Federal order policy are roughly the sums of the two separate changes. The one major exception is the Lake States, with Grade B milk a greater proportion of its total milk production and the sensitivity of its exports to Federal order policy changes.

Major Manufacturing Regions. Manufacturing milk in the Lake States declines 1.8 billion pounds (6 percent) under the reconstitution alternative, 1.0 billion pounds (3 percent) under the no classified pricing alternative, and 583 million pounds (2 percent) under the multiple basing points alternative. Under the national marketing order alternative, manufacturing milk in the Lake States increases 609 million pounds (2 percent). Thus, when combined with the support price reduction, the multiple basing points alternative affects the manufacturing industry in the Lake States the least of all the Federal order policy changes.

Manufacturing milk in the Northeast falls 839 million pounds (9 percent) with the support price cut alone, 12 percent with reconstitution, 26 percent with a national pool, and at least 30 percent with no classified pricing and multiple basing points. The support price decline augments reductions caused by Federal order policy changes that reduce or remove the incentive for milk to be interregionally marketed into the Northeast.

Remaining Regions. Adding the separate effects of a support price cut and Federal order changes roughly captures the effects of the combined changes on the remaining regions. The most notable effects are the manufacturing milk reductions of 1.3 billion pounds and 1.5 billion pounds in the Southern Plains and Corn Belt under the multiple basing points alternative.

Economic Efficiency

The policy alternatives suggest that significant gains in economic efficiency are possible. Federal order policies could be altered to generate market performance conforming more closely with that of competitive market forces, increasing economic efficiency and maintaining the public benefits of market stability. Such policy changes could include a multiple price-basing points system. Further gains appear to be possible by reducing the basic Class I differential and by accommodating reconstituted milk.

The economic efficiency measures shown in table 15 provide a rough approximation of the potential gains. They incorporate net gains or losses to consumers and producers (producer and consumer surplus), net savings or losses associated with transportation, and the savings in CCC purchases. At the higher support price, the no classified pricing alternative provides the largest gain in economic efficiency at about $1 billion. Of the other alternatives, the multiple basing points alternative provides the greater gain at $562 million, which is 55 percent of the gain under the no classified pricing alternative. To put these gains in perspective, reducing the support price alone results in a gain of $1.3 billion. The combined gains of Federal order and support price changes can be approximated by adding the results of the respective changes. Associated with these efficiency gains would be the long-term adjustments in the locations of milk manufacturing and processing.

Further Considerations

This section is intended to provide insight beyond the results of the specific alternatives analyzed and to qualify the results in certain cases. The discussion focuses primarily on issues concerning reconstitution

Table 15--Gains in economic efficiency under alternative price support and Federal order policies, 1985 1/

Region	$11.97 support price				$11.10 support price				
	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
	Million dollars								
Consumer gains:									
Fluid	120	0	1,170	533	602	722	602	1,627	1,127
Manufactured	0	0	2/-42	0	669	669	669	620	669
Total	120	0	1,128	533	1,270	1,391	1,270	2,248	1,795
Producer gains	73	147	-743	-291	-868	-810	-739	-1,532	-1,165
Marketing cost reductions:									
Transportation	0	30	17	33	8	2	19	3	27
Reconstitution	-30	NA	NA	NA	NA	-29	NA	NA	NA
CCC cost reductions	20	53	629	287	873	916	947	1,417	1,158
Total gains	183	230	1,031	562	1,283	1,469	1,498	2,136	1,815

NA = Not applicable.

1/ Gains are defined as changes in consumer surplus, producer surplus, and marketing costs from the 1985 base. Adjustment costs associated with shifts in the manufacturing milk industry are not included.

2/ The reduction in consumer gains under the no classified pricing alternative is due to an increase in simulated Class II prices.

and additional considerations about a national order and no classified pricing.

Reconstitution

Under the reconstitution alternative, the Federal order minimum Class I pricing structure is assumed to remain the same as that of the 1985 base. Implementing reconstitution without changing the regional structure of minimum prices would result in regional blend prices exceeding the cost of providing historically adequate supplies of fluid milk (fresh and reconstituted) in deficit regions. This is demonstrated by a 16-percent increase in total interregional shipments under reconstitution (see table 12) and greater supplies in deficit regions than necessary to meet regional fluid milk demands. Such shipping levels would require that substantial milk manufacturing capacity be built in southern deficit regions and would create major reductions in available manufacturing milk in the Southern Plains, Mid-Atlantic region, Northeast, and Lake States. Existing milk manufacturers would face higher prices for milk, but price increases would be limited by costs of establishing manufacturing capacity in the southern deficit regions.

Further analysis indicates the additional amounts that milk manufacturing plants would have to pay for milk to maintain base-level regional capacity. By holding regional Grade A milk in Class II at approximately the base levels, the regional structure of the manufacturing industry is maintained. The existing minimum Class I pricing structure combined with reconstitution would result in higher Class II prices paid for Grade A milk in manufacturing uses in the major exporting regions, such as the Lake States and Mid-Atlantic region (table 16). Compared with the results presented under the reconstitution alternative, these Class II price increases translate into further blend price increases in exporting regions, smaller reductions in importing regions and a smaller increase in shipping. Effective blend prices increase 59 cents in the Lake States, the Corn Belt, Kentucky-Tennessee, and the Southeast, and 20 cents in the Mid-Atlantic region. Interregional shipments increase 11 percent as opposed to 16 percent. Thus, if the manufacturing industry maintained its structure under the reconstitution alternative, producers in most regions could receive a significant share of the transportation cost reductions in the form of higher effective blend prices.

Changing the regulations governing pool qualification could further alter the distribution of the higher returns. Producers in both exporting and importing regions would be given incentives to share profits by transporting no more milk than actually needed at the existing price. Producers in exporting regions would likely request more liberal pooling requirements that would require less milk to be transported, reduce interregional marketing costs, and allow a greater transfer of revenues to the exporting producers. Producers in importing regions would have incentives to do the opposite. Establishing more stringent pooling qualifications would raise interregional marketing costs, reduce imports, and reduce the transfer of revenues from deficit to exporting regions.

A policy of reducing minimum Class I differentials to reflect the lower transportation costs under reconstitution would reduce the incentive for interregional shipping. As a result, there would be less upward pressure on Grade A milk manufacturing uses and less disruption of the milk manufacturing industry.

Table 16--Changes in regional prices under the reconstitution alternative from holding regional Class II milk at 1985 base levels

Region	Changes in effective prices		Region	Changes in effective prices	
	Class II	Blend		Class II	Blend
	Dollars per cwt			Dollars per cwt	
Northeast	0	-0.07	Lake States	0.23	0.59
Mid-Atlantic	.55	.20	Northern Plains	.12	-.19
Corn Belt	.08	.59			
Kentucky-Tennessee	.67	.59	Southern Plains	.09	-.19
			Mountains	0	.04
Southeast	0	.59	Northwest	.13	.04
Florida	0	.19	Southwest	0	.08
Deep South	0	.35	California	.50	.08

Reconstitution could also be implemented under both the no classified pricing and multiple basing points alternatives. Milk prices in deficit regions would fall even further under these alternatives if reconstitution were allowed. With exports available from the Corn Belt, Mid-Atlantic region, and Kentucky- Tennessee, the Lake States would not be expected to re-emerge as an exporter under either alternative with reconstitution. Thus, the underlying economic incentives for reconstitution would be substantially reduced because lower cost raw milk supplies would be available to deficit regions from closer sources than under the single basing point system.

The study did not consider reconstitution of butter and nonfat dry milk. Transporting such products is less costly than transporting a 50-percent concentrate. Thus, any economic effect under reconstitution would be even greater with the use of hard products, assuming full consumer acceptance. Furthermore, existing butter-powder manufacturing plants could be used. However, supplies closer to the deficit regions and the ability to store butter and nonfat dry milk could result in the Lake States exporting very little, if any, of such products for reconstitution. The results of the no classified pricing and multiple basing points alternatives indicate that the Corn Belt, Kentucky-Tennessee, and the Mid-Atlantic region could produce substantial quantities of butter and nonfat dry milk throughout the year for use in deficit regions on a seasonal basis.

National Marketing Order

The concept of a national milk marketing order is imprecise and could refer to a number of proposals. This study analyzes the isolated effects of establishing a national pool as the key vehicle for sharing revenues. An alternative to a national pool would be the "standby pool," which is often discussed as a means of sharing the costs and revenues of providing fluid milk to consumers. This system adds a reserve pool, known as a "standby pool," to the existing Federal order system. Such a pool existed outside the Federal order system in the 1970's. Processors in orders with high Class I price and/or use would pay an assessment on Class I use into the pool. Producers in regions with sufficiently low Class I price and/or use would receive payment for milk made available to the standby pool for Class I use in distant markets during seasonal shortages. Thus, producer revenues would shift from deficit regions to those with low Class I use. The regional effects of this system would depend on the assessment rate and specific provisions of the system.

No Classified Pricing

The no classified pricing alternative generates regional market prices for fluid milk that are determined by regional Grade A milk supplies, regional consumer demand, the additional within-region costs of marketing milk for fluid use, and transportation costs. This study does not deal with the possible response of farmers to additional market risk and uncertainty. Classified pricing and pooling have been part of the Federal order system since the 1930's. No recent historical data exist that can provide statistical inferences about likely producer responses in the absence of classified pricing and pooling. The history of the dairy industry indicates, however, that producers are highly likely to strive for alternative regulatory mechanisms and market institutions if they perceive a worsening economic environment.

To the extent that abandoning classified pricing and revenue pooling would result in greater price variability, producers would likely reduce production and both producer and consumer prices would rise above prices shown in this study. The magnitude of any increase in price variability on the downside is limited by the support price. The role of Federal milk marketing orders in monitoring markets and providing market information could be retained or expanded. In doing so, competitiveness of markets could be assured, thereby reducing undue risk and uncertainty associated with excessive market power.

Conclusions

The Federal order policy alternatives analyzed range from more restrictive than the 1985 base, such as under the national marketing order alternative, to less restrictive, such as under the no classified pricing alternative. Multiple basing points and reconstitution under a single price-basing point system are alternatives that maintain the regulatory structure of classified pricing and regional revenue pooling but move toward greater market orientation.

These policy options differ substantially in their effects on the level and regional distribution of revenues among producers, consumer expenditures on fluid milk products, interregional marketing patterns, and CCC purchases of surplus dairy products. Furthermore, changes in the regional availability of milk for manufacturing could substantially alter the location and structure of the manufactured dairy products industry.

The no classified pricing alternative indicates the possible prices and quantities that would be generated if Federal orders were to eliminate classified pricing and pooling regulations. Fluid milk prices in most regions exceed the manufacturing milk price (M-W) by no more than the average regional fluid milk marketing costs. Fluid milk prices exceed these levels only in Kentucky-Tennessee, the Southern Plains, and the southern deficit regions. Interregional shipments of milk for fluid use are reduced by about one-third compared with the 1985 base. Thus, the results from the no classified pricing alternative can serve as a standard for comparing the other alternatives.

Producer Revenues

Federal order provisions set minimum class prices and establish the rules under which producer revenues are pooled. These minimum prices and revenue pools are major factors in establishing the overall level of producer revenues and their regional distribution. This regional distribution is closely related to interregional marketing patterns.

National producer revenues under the reconstitution and national marketing order alternatives are virtually unchanged and are redistributed regionally in favor of the Lake States and California. Under the no classified pricing alternative, national revenues fall about 11 percent. Producers in the Lake States, Florida, the Deep South, and Southern Plains fare best under this alternative, indicating that they benefit the least under the 1985 Federal order system. Revenue declines in California are consistent with this group, as would be expected since its Class I differential is lower than any in the Federal order system. Conversely, producers in the Northeast, the Mid-Atlantic region, the Corn Belt, Kentucky-Tennessee, and the Southwest fare the worst, indicating that they benefit the most under the 1985 system. Revenue losses under the multiple basing points alternative are about half those under the no classified pricing alternative and are distributed more evenly among regions. The Northeast, Mid-Atlantic region, Southwest, and southern deficit regions lose relatively more than other regions under this alternative.

Consumer Expenditures

The existing Federal order system could be modified to provide savings to consumers. Total consumer expenditures on fluid milk drop 14 percent under the no classified pricing alternative from the 1985 base and 6 percent under the multiple basing points alternative. The reconstitution alternative reduces fluid expenditures by 1 percent, with reductions concentrated in the southern deficit regions at 3-10 percent. A multiple basing points pricing system, as defined here, would provide greater and more widely distributed savings to consumers than would facilitating reconstitution under the current single basing point system.

Interregional Marketing Patterns

Changes in Federal order policies that alter regional minimum Class I prices, regional or national pooling provisions, and interregional marketing costs directly affect the interregional marketing and shipping of Grade A milk. Changing marketing patterns are closely associated with changes in the distribution of revenues

among regions. Reconstitution under a single basing point system results in an increase in interregional marketings and shipments from the major exporting regions, the Lake States and Mid-Atlantic region. The national order, no classified pricing, and multiple basing points alternatives result in reductions in actual shipments of at least 50 percent. Under these alternatives, interregional marketings east of the Rockies are largely limited to marketings from the Corn Belt and Kentucky-Tennessee to southern deficit regions.

Regional Milk Available for Manufacturing

Changes in Federal order policies can substantially affect the location and structure of the milk manufacturing industry. As interregional milk marketing patterns shift in response to policy changes, regional availability of manufacturing milk also shifts. In regions where milk available for manufacturing is reduced significantly, some manufacturing plants would probably no longer be profitable and would likely close.

Reconstitution under the single basing point pricing system could substantially reduce milk available for cheese, nonfat dry milk, and butter in the Southern Plains, Mid-Atlantic region, and Northeast. A national order and revenue pool would increase manufacturing milk in all major manufacturing regions, except the Northeast. No classified pricing and multiple basing points would reduce manufacturing milk in the Northeast, Corn Belt, and Southern Plains, while increasing it in the Lake States and Mid-Atlantic region.

Government Purchases

Federal order policies interact with support prices to influence the amounts of milk produced both regionally and nationally, commercial use of fluid and manufactured dairy products, and CCC purchases. At a given support price, lower Class I differentials reduce blend prices, resulting in lower quantities produced, greater fluid milk use, and lower CCC purchases. Average CCC purchases at the 1985 support price under multiple basing points and no classified pricing alternatives fall by about 2.5 billion pounds for each dollar reduction in the weighted average Class I differential. This compares with a reduction of about 8 billion pounds for a dollar reduction in the support price, as extrapolated from the 87-cent support price reduction evaluated in this study. The support price cut affects both fluid and manufacturing milk and Grade A and Grade B milk producers.

Economic Efficiency

The policy alternatives suggest that significant gains in economic efficiency are possible. Federal order policies could be altered to generate market performance conforming more closely with that of competitive market forces, increasing economic efficiency, and maintaining the public benefits of market stability.

The economic efficiency measures incorporate net gains or losses to consumers and producers (producer and consumer surplus), net savings or losses associated with transportation, and the savings in CCC purchases. At the higher support price, the no classified pricing alternative provides the largest gain in economic efficiency at about $1 billion (table 15). Of the other alternatives, multiple basing points provides the greatest gain at $562 million, which is 55 percent of the gain under the no classified pricing alternative. To put these gains in perspective, reducing the support price 87 cents per cwt alone results in a $1.3-billion gain.

Possible Effects of the Food Security Act of 1985

The FSA raised minimum Class I differentials in 34 of 44 Federal milk marketing orders while providing for lower support prices. The results of the no classified pricing and multiple basing points alternatives indicate that only in Kentucky-Tennessee, the Southern Plains, the Southeast, the Deep South, and Florida is there any market-generated need for fluid milk prices to exceed manufacturing milk prices by more than regional fluid marketing costs. Market forces generate the highest fluid differential at $4 in Florida, 80 percent of its 1985 effective Class I differential. Results of the multiple basing points alternative indicate that a minimum Class I differential of $1.12 ensures adequate supplies of milk for fluid uses in all but the five regions just listed. The implications of this study are that the increased differentials tend to:

- Increase Grade A producer revenues nationally and in regions with no shortage of milk that could be used for fluid products. This includes all regions other than Florida, the Mountains, and the Southwest, which had no change, and California, which is State regulated.

- Increase CCC purchases, offsetting the effects of reduced support prices, thereby increasing the likelihood of future support price reductions under the FSA.

o Increase consumer expenditures on fluid milk, particularly in markets with no shortage of milk that could be used for fluid products.

o Perpetuate the current regulated pricing structure, which generates more shipping at greater costs than could be attained under alternative regulations, including the multiple basing points and no classified pricing alternatives.

o Increase Grade A supplies in regions not needing higher differentials to ensure adequate supplies of milk for fluid use and without adequate capacity for manufactured dairy products. As a result, either excess Grade A milk is transported out of these traditionally deficit regions or additional processing capacity is built.

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Appendix I: Highlights of Model and Parameter Specifications

The interregional trade model used in this study incorporates classified pricing under milk marketing orders, marketwide revenue pooling, and support prices. It solves for regional producer milk supplies, milk demanded for use in fluid and manufactured dairy products, Class I prices, Grade A blend prices, producer revenues, consumer expenditures, interregional milk marketings, and Government purchases under the price support program. The model includes regional Grade B milk supplies and national commercial demand for milk in manufacturing use and CCC removals. The model solves for market equilibrium prices and quantities, subject to Federal order regulations and the dairy support price.

The interregional nature of this study warrants a brief discussion of the economic forces and Federal order regulations affecting interregional marketings of raw milk. A discussion of the model follows this background: the market variables for which it solves, the necessary assumptions, and how the policy alternatives are facilitated within it. The remainder of the appendix outlines the model parameters, discusses the specific assumptions under each policy alternative, and presents the mathematical model.

Interregional Marketings

Under Federal milk marketing orders, milk is marketed interregionally primarily in two ways. The most common way is for producers, or producer cooperatives, to market milk to a pooled processor in a marketing order located in another region. The second way, occurring primarily during seasonal shortages, is for supply plants to export milk to pooled processors (distributing plants) in another region.

Direct Shipping

Producers and their marketing cooperatives may market milk to any Federal order and, if they meet the pooling qualifications, receive the monthly blend price on all milk pooled in that receiving order. Each order may require that minimum amounts be transported during specified time periods in order for the exporter to qualify for the blend price. Producers or cooperatives have an incentive to market milk to distant orders as long as the effective blend price in distant markets exceeds the local blend price by at least the interregional marketing cost. The interregional marketing costs in this study are determined by the average cost of transporting milk and the proportion of milk pooled in a given order that must actually be transported to qualify for pooling under the order.

Seasonal Shipping

Seasonal shipments of milk are typically made to deficit markets during the late summer and fall when their milk production falls short of fluid and soft product needs. A supply plant in the exporting order generally ships to a processor in the importing order (for example, Chicago to southeastern Florida). Seasonally shipped milk is pooled in the exporting marketing order, thereby receiving the minimum Federal order prices of the exporting order but the class use of the importing order. Hence, the value of the milk reflects the use value of the importing order and the location value of the exporting order. Any increase in the blend price in the exporting market is shared with all producers pooled in the exporting order. Any revenue received by the exporting supply plant in the form of an over-order payment is retained by the exporter and is not shared with other producers in the exporting order. The over-order payment in the exporting order is generally attributed to the value to the exporter of the milk in manufacturing uses. Thus, such payments are known as "give-up charges."

Over-order payments are also attributed to any transportation costs in excess of the difference between the values of the milk in the exporting and importing orders, as defined by the Federal order blend prices. The additional cost of transporting milk is generally revealed in any over-order payment in the importing market paid by fluid milk processors to the marketing cooperative involved in providing the milk. Therefore, the price of imported milk should reflect the minimum Class I prices in the exporting order, the give-up charges, and the costs of transporting the milk. Given sufficient competition, these over-order payments would apply to all regulated milk in the respective importing and exporting orders, as they reflect the average value of milk based on minimum Federal order prices and marketing costs. In the case of excessive bargaining power or misinformation, over-order payments may not reflect actual costs.

The over-order payments allow effective prices to be dynamic, given the fixity of minimum Federal order Class I and II prices in the short term. When local

production falls short of fluid and soft product demand at prevailing prices, the over-order payments are likely to increase, raising the effective market blend price and ultimately providing the incentive to import milk. As marketings increase, additional supplies in the importing market cause prices to drop, and the give-up charges in the exporting market increase as the alternative use becomes relatively more valuable. Finally, the marketings cease when interregional marketing costs exceed the difference in effective blend prices.[7]

The effective blend prices in both importing and exporting orders reflect the use values of milk at the minimum Federal order prices, and the additional costs associated with delivering the milk to the distant market. The over-order payment in the exporting order results in an effective blend price equal to that generated if the exported milk were actually pooled in the importing order.

Summary

Both direct and seasonal shipping can be analyzed within a framework of effective blend prices and interregional marketing costs. As long as the difference in effective market blend prices exceeds the marketing cost, an economic incentive exists to market milk interregionally to the higher priced market. Marketings will stop expanding when the prices differ by the average marketing costs, market forces having bid the price up in the exporting region and down in the importing region. Major regional changes in both minimum and effective Class I differentials, actual transportation costs, and pooling requirements are likely to significantly change marketing patterns as market prices, including over-order payments, change.

Interregional Trade Modeling

Interregional trade modeling is rooted in the work of Enke and Samuelson (*11*) and Takayama and Judge (*7, 32*). Analyzing the dairy industry requires the difficult task of modifying otherwise competitive models to account for classified pricing and revenue pooling. Recent methods include those by Dahlgran (*7*) and Hallberg, Hahn, Stammer, Elterich, and Fife (*15*). Dahlgran used a reactive programming algorithm to develop a model for comparing a simulated competitive equilibrium with an observed set of prices and quantities, which was generated by a regulated equilibrium with classified pricing and revenue pooling. Hallberg and others used a standard quadratic programming algorithm in which equilibrium blend prices were generated by iteration.

McDowell (*26*) specified an interregional trade model of the dairy industry that incorporated regional blend prices as nonlinear constraints. The model was solved using separable linear programming techniques (*10, 24*). For this study, regional Grade A milk markets are assumed to equilibrate when blend prices are aligned by interregional marketing costs (*6*). Advances in computer software allow the use of the General Algebraic Modeling System (GAMS) to directly solve the model as a nonlinear programming problem with nonlinear constraints.

Model Overview

Policy Alternatives

This study analyzes the following policy alternatives, at both the announced 1985 average support price of $11.97 and a lower support price of $11.10:

- o Facilitating reconstitution using reverse osmosis filtration under the current single price-basing point system.
- o Establishing a national marketing order that incorporates a national producer revenue-sharing pool.
- o Eliminating both classified pricing of Grade A milk and revenue pooling under Federal orders.
- o Establishing a multiple price-basing points system.

This study analyzes the effects of these policy alternatives on the dairy industry on an annual basis. The manufacturing milk market for hard products is specified nationally but includes regional Grade B production. Special assumptions are made about soft manufactured products under the various alternatives. The primary focus of the study is the interregional equilibrium of Grade A and fluid milk markets. The interregional trade model of the Grade A and fluid markets simulates an existing multimarket equilibrium, given the following information for each market:

- o Grade A quantities produced.
- o Fluid quantities demanded.

[7]Depending on contractual arrangements between cooperatives and processors, the value of milk in a specific location and form during a specific time period may be spread out over the course of a contract year. This would mask the seasonality in over-order payments that would exist if all negotiations, bargaining, and marketing transactions took place at the time of shipment.

- o Fluid demand and Grade A supply elasticities.
- o Minimum Class I and Class II Federal order differentials.[8]
- o Over-order payments.
- o Class I and Class II use of market deliveries.
- o The M-W price.
- o Interregional marketing costs.

Supply functions for Grade A milk are positioned with the regional overall blend price (calculated from use, minimum class prices, and over-order payments), quantities produced, and elasticities. Fluid demand functions are positioned with the effective Class I prices, fluid quantities demanded, and elasticities.

Spatial Equilibrium

Spatial equilibrium in the dairy industry is reached by assuming that:

- o Over-order payments reflect the value of milk at a specific location in competing uses averaged over 1 year.
- o Milk is interregionally marketed until regional effective blend prices are aligned by marketing costs.
- o Observed effective regional blend prices are equilibrium prices, reflecting equilibrium quantities supplied and demanded in each use, minimum Federal order prices, and over-order payments.

The assumption on over-order payments applies to annual averages that reflect the demand for milk in deficit regions, the value of milk in manufacturing uses in exporting regions (give-up charges), interregional marketing costs, and within-region marketing costs. The value of milk in manufactured product uses is related to the profitability of an exporting plant's manufacturing operations and the cost of underusing plant capacity when milk is given up for fluid milk markets. This assumption on over-order payments implies that buyers and sellers compete without excessive bargaining power. If this is generally true, spatial economic theory can be used to establish a feasible market equilibrium. The difference in effective market blend prices between two regions cannot exceed the average interregional marketing cost in equilibrium. Otherwise, economic incentives would arbitrage the markets back into equilibrium. Thus, a set of interregional marketings can be found that is consistent with a given set of regional prices, quantities supplied and demanded, and regional blend price differences. Under these assumptions, the model generates a set of base quantities, prices, and interregional marketings from which to compare the effects of alternative policies.

Evaluation of alternative Federal order policies with the model requires specific assumptions about the following key variables or parameters concerning interregional marketing:

- o Average per-cwt costs of transporting milk.
- o The proportion of milk pooled in a market or order that is actually transported to the market (pool qualification requirements).
- o The over-order payments that are considered to be local fluid marketing (or balancing) costs.

The policy alternatives are modeled by changing such parameters as minimum Class I differentials, transportation costs, pooling requirements, and the support price. Discussion of the specific assumptions on these parameters and important variables, such as over-order payments, and the data requirements are presented in the following section.

Model Parameters

Annual average prices, quantities, and elasticities are developed for 14 regions. Included are regional functions for fluid milk demand and Grade A and Grade B milk supply. The market for milk in hard manufactured products is specified nationally. The demand for milk in soft products requires special treatment by policy alternative.

Regional Demarcation

Federal milk marketing orders and non-Federal order areas are aggregated into 14 regions covering the 48 contiguous States (see fig. 3). Federal marketing orders are combined with surrounding non-Federal order areas to form logical regional divisions. Where Federal milk marketing order areas overlap State boundaries, the order marketing area is generally the overriding factor in determining the regional boundary. Data for State-regulated markets are used when available and applicable. Unregulated markets are assumed to behave as the nearest Federal milk marketing order.

[8] All prices include a butterfat premium at regional test.

Quantities, Prices, and Elasticities

The model includes regional Grade A and Grade B milk supplies and fluid demand, and national demand for manufacturing milk purchased commercially and by the CCC. Base prices used in the model for fluid and Grade A milk incorporate 1985 Federal order minimum prices (including the value of butterfat) plus over-order payments and State-regulated prices. The method of handling blend prices in the model limits the number of classifications to two. Milk in fluid use is designated Class I, with all Grade A milk moving into manufactured dairy products use designated Class II. Discussion of quantity, price, and elasticity data is presented in terms of Grade A and Grade B supply, fluid demand, and manufacturing milk demand. (See "Data Sources" for source of prices and quantities.)

Supply

Regional Grade A and Grade B supply functions are aggregations of each State in a given region. Grade B milk is produced in 11 of the 14 regions. Regional Grade A and Grade B prices are weighted averages, using the aggregated market quantities as weights. The supply price for Grade B milk is the 1985 weighted average of manufacturing milk prices for each State, adjusted for regional butterfat content. Regional Grade A supply prices are weighted average market blend prices. Overall regional effective blend prices are f.o.b. plant prices calculated from regional Class use and regional effective Class I and Class II differentials, adjusted for regional butterfat content (app. table 1). The regional effective Class I differentials consist of weighted averages of minimum Class I differentials, Class I over-order payments, and butterfat differentials. The regional Class II differentials are similar weighted averages, accounting for two manufacturing classes in areas where they exist. In 1985, 34 of 44 Federal orders included two manufactured dairy product classes (Class II and Class III). The small price difference between these two classes minimizes the error caused by any change in their proportions in subsequent alternatives. These differentials are added to the M-W price to arrive at regional Class I and Class II prices.

The regional Grade A and Grade B own-price supply elasticities used in the model are quantity-weighted

Appendix table 1--Regional Class I and II price differentials and use rates, 1985

Region	Total differential 1/		Use proportion	
	Class I	Class II	Class I	Class II
	Dollars per cwt			
Northeast	3.40	0.53	0.44	0.56
Mid-Atlantic	2.95	.34	.49	.51
Corn Belt	2.51	.46	.49	.51
Kentucky-Tennessee	3.22	.59	.75	.25
Southeast	3.75	.59	.80	.20
Florida	4.97	.33	.88	.12
Deep South	3.26	.32	.75	.25
Lake States	2.45	.46	.17	.83
Northern Plains	2.51	.49	.39	.61
Southern Plains	3.06	.58	.60	.40
Mountains	2.67	.24	.58	.42
Northwest	2.49	.51	.34	.66
Southwest	2.99	.49	.59	.41
California 2/	1.80	-.11	.40	.60

1/ Includes regional weighted average minimum Federal order Class I and Class II differentials, over-order payments, and butterfat differentials.

2/ Equivalent differentials and use proportions for California were derived based on 1985 average Federal order base price of $11.72 per cwt at 3.5-percent butterfat.

Sources: (33) and "Data Sources."

averages of State-level annual milk production elasticities estimated by Buxton, measuring the 4-year response to milk price changes (*3*). The quantities, elasticities, and prices pertinent to the Grade A milk market are shown in table 3 and appendix table 2 for Grade B milk markets.

Demand

Regional fluid demand quantities are developed from Federal order in-area sales data and from State-regulated area consumption data. Per capita consumption for each of these markets is derived from these quantities and area populations. Per capita fluid consumption in nonregulated areas is extrapolated from adjacent Federal orders and/or State-regulated areas. Regional fluid demand quantities are then derived by multiplying the regional population by the computed regional per capita consumption.

Class I prices are used to position the fluid milk demand curves. Regional fluid prices are quantity-weighted averages of effective Federal order and State-regulated prices. Effective Federal order Class I prices are the sums of minimum Class I differentials, butterfat differentials, over-order payments, and the M-W price.

Demand elasticities are developed from the U.S. food demand system estimated by Huang (*20*). These elasticities are transformed to the first-handler level by transmission elasticities (*23*) to -0.085 for milk used in fluid and soft manufactured products and -0.245 for milk used in hard manufactured dairy products. Quantities, prices, and elasticities used to position regional fluid demand functions are shown in table 3.

Manufactured Products Market

The conversion of manufactured dairy products to whole milk equivalents is difficult because of the joint product nature of fat and nonfat milk solids. As a result, slippage and potential inconsistencies are likely in accounting for CCC and commercial purchases of hard manufactured dairy products in milk equivalent (fats-solids basis) and soft manufactured product consumption. Therefore, manufacturing milk in commercial use for hard products is a residual of Grade A and B quantities supplied less fluid and soft product uses and

Appendix table 2--Grade B market variables: Supply elasticities and model-generated prices and quantities under both support prices, 1985

Region	Elasticity	$11.97 support price		$11.10 support price	
		Price	Quantity	Price	Quantity
		Dollars per cwt	Million pounds	Dollars per cwt	Million pounds
Mid-Atlantic	0.508	11.69	433	10.82	416
Corn Belt	.469	11.60	2,879	10.73	2,776
Kentucky-Tennessee	.914	11.44	348	10.57	324
Southeast	.569	11.75	74	10.88	71
Deep South	.659	11.34	78	10.47	74
Lake States	.582	11.85	10,972	10.98	10,496
Northern Plains	.375	11.55	1,336	10.68	1,297
Southern Plains	.769	11.51	257	10.64	242
Mountains	.507	11.48	269	10.61	258
Northwest	.388	11.61	1,031	10.74	1,000
California	.222	11.31	668	10.44	656
Total	NA	11.73	18,345	10.86	17,611

NA = Not applicable.

Sources: (3, 36, 37).

CCC purchases. Equilibrium in the manufacturing milk market is completed by incorporating imports (primarily cheese) and beginning and ending levels of commercial stocks. In 1985, this represented a net addition to the market of 3.1 billion pounds. Any existing Government stocks are considered to remain constant in the model and no sell-back operations from Government stocks to commercial use are included. Model parameters for the manufacturing milk market are given in appendix table 3.

The demand for Grade A milk in soft product use is difficult to handle analytically because of limited regional consumption data and because of the model's two-class limitation. The quantity of milk demanded in soft product use is derived from Class II deliveries in 34 of 44 Federal orders having a separate classification for milk in soft product use. From these deliveries and order populations, the national per capita quantity of milk in soft product use is calculated to be 50 pounds per year.

For each support price, milk in soft product use is calculated and subtracted from the manufacturing milk supplies available for hard products. The national quantity of milk demanded in soft product use increases with a reduction in the support price that results in a decline in the Class II prices. The national weighted average Class II (soft product) effective differential of 34 cents is used. Thus, the changes in milk used in soft products and CCC and commercial purchases of milk in hard products are consistent at the national level.

Regional soft product needs are accounted for in two ways. First, alternatives that include classified pricing and revenue pooling require that Class I use not exceed 90 percent (an effective reserve requirement of 10 percent of fluid use). This is consistent with the 1985 annual average Class I use of 88 percent in Florida. Thus, regional soft product consumption is not an issue.

Second, under the no classified pricing alternative, soft product use is assumed to require Grade A milk. Therefore, the demand for Grade A milk in regions must include both fluid and soft product uses. The national average per capita use of raw milk for soft products is multiplied by the population in each region and added to the demand for milk in fluid use (horizontal shift of the regional demand curve). The nature of regional soft product demand data requires the national average to be used for each region. However, the national average appears to be appropriate in providing a reasonable idea of the effects of such a radical change in policy. If anything, it appears that this may overestimate demands for milk in Florida, the Southeast, and the Deep South. This, in turn, lends credence to the results, as any error is on the high side in terms of price. Any difficulties from actual regional soft product demand differing from the average are in terms of regional prices for Grade A milk and milk available for manufacturing use.

Because of the importance of the M-W price to the Federal order system, the 1985 average M-W price is used as the equilibrium manufacturing milk price. Government purchases of hard manufactured dairy products support the manufacturing milk price, resulting in an effective support price for raw milk in such uses. The 1985 average announced support price (3.5-percent butterfat) was $11.69, 21 cents greater than the

Appendix table 3--Manufacturing milk market parameters, 1985

Item	Quantity	Price 1/	Elasticity
	Million pounds	Dollars per cwt	
Commercial demand 2/	76,951	11.76	-0.245
Government demand	13,174	11.76	NA
Ending stocks	4,600	NA	NA
Beginning stocks	4,900	NA	NA
Imports	2,800	NA	NA

NA = Not applicable.

1/ Manufacturing milk demand positioned with 1985 annual average M-W price of $11.48 at 3.5-percent butterfat. The price is adjusted to the national average of 3.67-percent butterfat by 16.4 cents for each tenth of a percent difference from 3.5 to reach $11.76.

2/ Commercial demand for soft products is estimated at 11,682 million pounds, based on per capita consumption of 50 pounds.

average M-W of $11.48. This margin between the announced support price and the M-W price is held constant in all alternatives. Minimum Federal order Class I prices are based on the M-W price lagged 2 months.

In 1985, the annual average M-W price was $11.48, while the annual average M-W price lagged 2 months was $11.72, a difference of 24 cents. This difference was partly due to the decline in the support price from $12.60 on January 1, 1985, to $11.60 over the course of the year. This difference was incorporated into the model to maintain consistency of the annual average minimum Class I prices with the annual average support price. Thus, the Federal order base price (lagged M-W price) for Class I differentials exceeds the current M-W price by 24 cents within the model at the higher effective support price. At the lower effective support price, the M-W price is assumed to be stable after 4 years of adjustment, making the 2-month lag irrelevant. At both support prices, the margin between the announced support price and the effective support price (M-W price) remains unchanged.

Over-order Payments

Market forces may generate effective prices above minimum Federal order prices. This difference, termed over-order payment, reflects the relative value of milk in competing uses at a specific location averaged over 1 year. Over-order payments on Class I milk in the model are assumed to include two components:

- o The fluid milk marketing costs in meeting the requirements of fluid milk processing plants.
- o All other costs associated with fluid milk marketing, including give-up charges and transportation costs beyond the minimum Class I differentials.

Under the first component, producer cooperatives and supply plants incur costs in meeting the standards, butterfat content, and timing of deliveries, required by fluid milk processing plants. These costs are incurred in each region. Under the second component, the value of milk in manufacturing uses, or give-up charges, is captured. The value of the charge depends on the net returns from the manufacturing operations, the additional costs of underusing plant capacity when milk is given up for sales to fluid milk markets, and the demands for additional milk in fluid use. Other costs incorporated into over-order payments are primarily those associated with interregional transportation costs.

Two levels of regional fluid marketing costs are assumed with policy alternatives that require lowering the effective Class I differential. The cost levels are based on observed over-order payments for 1985 in orders with market characteristics supporting their use as cost estimates. These are relatively isolated orders that neither export nor import large amounts and have relatively low minimum Class I differentials. Such orders are assumed to generate over-order payments corresponding to regional fluid marketing costs.

On the other hand, higher differentials apparently tend to limit the need for over-order charges in regions with relatively low Class I use. Therefore, under alternatives with significantly lower regional minimum differentials (no classified pricing and multiple basing points), regional fluid marketing costs are assumed to be 22 cents. This is taken from the 1985 average level of over-order payments in the Pacific region, as designated by the Federal order system. This region had a relatively low minimum Class I differential ($1.62 per cwt) and low Class I use (36 percent) and did not export significant quantities of fluid milk. Under alternatives where regional minimum Class I differentials remain high but effective differentials in some regions need to be lowered (the reconstitution alternative), 11 cents per cwt is used. This is the amount recorded in an undisclosed market having a minimum Class I differential exceeding $2.50 and Class I use of less than 60 percent.

The regional fluid milk marketing costs associated with supplying fluid processing plants could differ from the 11 cents and 22 cents used in this study. If so, then the affected Grade A milk in fluid (and soft product use with no classified pricing) would be priced accordingly. Any difference in these marketing costs would be applied to all milk moving to fluid uses and reflected in Grade A milk prices according to the proportion in such uses. These costs are regional and are not pertinent to interregional marketing. Because fluid demand is relatively unresponsive to price changes, very little quantity change would be expected given the magnitude of possible error. Thus, any error in regional marketing cost would cause Grade A milk prices to vary by about the error in costs times the proportion of regional Grade A milk in fluid use.

Reconstitution

Reverse osmosis filtration, a membrane separation process, is assumed to be used to reconstitute milk into fluid products. This process yields a 50-percent concentrate, resulting in a 50-percent decline in average transportation costs. The economic feasibility of reverse osmosis in fluid milk marketing requires that any cost advantages from its use not be offset by revenue losses that could result from less than complete consumer acceptance. This analysis assumes that consumers perceive fluid milk products made with

the use of reverse osmosis to be perfect substitutes for traditionally handled fluid milk products.

This study assumes an average variable cost of reverse osmosis of 26 cents per cwt, as estimated by Winchell and Hammond (*40*). The recombining costs are assumed to be 9 cents per cwt as estimated by Hammond, Buxton, and Thraen (*16*). It is assumed that only the variable portion of the reverse osmosis cost and the recombination costs are incurred in fluid uses. Hence, the total cost of reconstitution using reverse osmosis is assumed to be 35 cents per cwt. The model includes these costs as fixed transportation costs.

Interregional Marketing Costs

Interregional marketing costs for the 1985 base alternative as well as transportation costs based on 35 cents per cwt per 100 miles are shown in appendix table 4.[9] The 1985 base alternative assumes that marketing costs between regions are equal to effective blend price differences. For all other alternatives, the average transportation costs and pool qualification requirements must be known or assumed to obtain interregional marketing costs. The model handles interregional marketings between two nonadjacent regions by stairstepping through consecutively adjacent regions. For example, a shipment from the Lake States to the Southeast would first go through the Corn Belt and Kentucky-Tennessee. The model routes shipments such that marketing costs are minimized, subject to the other constraints.

The study appears to be unique in its method concerning interregional marketing costs. Previous studies have assumed that all milk marketed interregionally for fluid use is actually transported. In so doing, these studies overestimate the marketing costs involved in the total amount pooled or marketed and, thus, underestimate the amount of milk marketed interregionally and the effects of policy changes on regional blend prices.

This study explicitly addresses the fact that not all milk marketed interregionally is actually transported. If the assumed pooling percentage is below the actual percentage of pooled milk transported, then the assumed marketing costs are too low and the simulation will indicate greater amounts marketed interregionally than actual amounts. This overestimate will, in turn, overestimate the effects of policy changes on regional blend prices. The opposite is true if the assumed percentage of pooled milk transported is greater than actual amounts. As with other models, however, capturing and reflecting all of the dynamic market behavior apparent in the dairy industry is not possible.

Some insight into interregional milk marketing patterns and the differences between transportation costs and imputed marketing costs are shown in appendix table 5. The 1985 levels of Class I differentials effectively limit seasonal shipments from the Mid-Atlantic region and Northeast to the Southeast and Florida. These shipments generally come from the Lake States, are pooled in the exporting order, and are likely to incur the full cost of transportation, reflecting the fact that such milk is pooled in the originating order.

On the other hand, the Southern Plains requires far less, if any, seasonal shipments. Instead, substantial quantities of imported milk are directly pooled, and a lower proportion of the milk marketed (pooled) interregionally into the Southern Plains is actually transported. In this situation, the difference in overall blend prices between the Lake States and Southern Plains is substantially less than the total cost of moving milk that distance. This difference can be contrasted with the differences in prices between the Lake States and Florida. These differentials are closer to the total cost of moving all the milk the entire distance at 35 cents per cwt per 100 miles. The actual average cost of transporting milk from the Lake States to the Southern Plains (via the Northern Plains) is $3.31, while the price difference is only $1.38 (appendix table 5). One may infer from this that the required shipment to Southern Plains orders is about 42 percent of the amount pooled annually. The price difference from the Lake States to Florida, on the other hand, is about 80 percent of the actual transportation cost.

These observations and Federal milk marketing order regulations concerning requirements for pool qualifications are used to establish the assumed requirements for milk to be pooled into a region other than where it is produced (*36*). For all alternatives that include classified pricing and pooling, the following proportions of interregionally pooled quantities are assumed to actually be transported:

- 75 percent into the Southeast and Florida.
- 65 percent into Kentucky-Tennessee.
- 50 percent into all other regions.

The marketing costs associated with reconstituted fluid milk are handled by assuming that the average transportation is reduced by half (17.5 cents per cwt), reflecting a 50-percent concentration of milk and as-

[9] From telephone interviews with managers of milk marketing cooperatives, the average transportation cost of 35 cents per cwt per 100 miles was reached.

Appendix table 4--Interregional marketing costs, 1985

Regions		Miles	Marketing costs per cwt	
Origin	Destination		Imputed 1/	Transportation 2/
				Dollars
Northeast	Mid-Atlantic	167	0.16	0.58
Mid-Atlantic	Northeast	167	.16	.58
Mid-Atlantic	Southeast	563	1.59	1.97
Mid-Atlantic	Corn Belt	566	.16	1.98
Southeast	Florida	507	1.32	1.77
Corn Belt	Mid-Atlantic	566	.16	1.98
Corn Belt	Kentucky-Tennessee	304	1.19	1.06
Corn Belt	Southern Plains	630	.64	2.21
Corn Belt	Deep South	490	1.14	1.72
Deep South	Southern Plains	480	.50	1.68
Deep South	Southeast	336	.58	1.18
Kentucky-Tennessee	Deep South	341	.06	1.19
Kentucky-Tennessee	Southeast	214	.52	.75
Lake States	Northern Plains	432	.53	1.51
Lake States	Corn Belt	319	.74	1.12
Northern Plains	Southern Plains	514	.85	1.80
Northern Plains	Mountains	555	.42	1.94
Southern Plains	Southwest	552	.15	1.93
Southern Plains	Deep South	480	.50	1.68
Southern Plains	Mountains	672	.43	2.35
Mountains	Northern Plains	555	.42	1.94
Mountains	Southern Plains	672	.43	2.35
Mountains	Southwest	435	.28	1.52
Mountains	Northwest	320	.53	1.12
Northwest	Mountains	320	.53	1.12
Southwest	Southern Plains	552	.15	1.93
Southwest	Mountains	435	.28	1.52
California	Northwest	649	.84	2.27
California	Mountains	686	1.10	2.40
California	Southwest	815	1.39	2.85

1/ Imputed marketing costs are the observed differences in overall blend prices between regions.
2/ Transportation costs are based on 35 cents per cwt per 100 miles.

suming that the pooling requirements remain the same. In addition, a fixed cost of 35 cents per cwt is assessed to cover the concentration and recombining costs.

The Class I differential in California is lower than any existing in the Federal order system. Marketings out of California were relatively minor in 1985 (99 million pounds) and are held at their 1985 levels under all alternatives, except those of reconstitution under a single basing point and the national order, which could provide sufficient additional incentive for California to export or to become regulated by Federal orders. Under the no classified pricing and multiple basing points alternatives, any existing incentive for California to join the Federal order system would be further reduced. So under these alternatives, California exports are fixed.

These assumptions on transportation, pooling requirements, and over-order payments allow all exports to be treated as if they are pooled in the importing region. This results from the role of over-order payments in equalizing the effects on regional blend prices of exports as direct pooled shipments or as seasonal shipments to deficit markets.

Specific Assumptions on Alternatives

This section highlights the specific assumptions made under each policy alternative analyzed concerning the market variables and parameters. Assumptions are made for minimum Federal order Class I differentials, over-order payments, transportation costs and pooling requirements (required for the interregional marketing

Appendix table 5--Proportion of selected interregional marketings transported, 1985

Route of interregional marketings 1/	Marketing costs		Proportion 3/
	Imputed 2/	Transportation	
	Dollars		
Lake States to Southern Plains:			
Lake States to Northern Plains	0.53	1.51	0.351
Northern Plains to Southern Plains	.85	1.80	.472
Total	1.38	3.31	.417
Lake States to Southern Plains:			
Lake States to Corn Belt	.74	1.12	.661
Corn Belt to Southern Plains	.64	2.21	.290
Total	1.38	3.33	.414
Lake States to Florida:			
Lake States to Corn Belt	.74	1.12	.661
Corn Belt to Kentucky-Tennessee	1.19	1.06	4/1.123
Kentucky-Tennessee to Southeast	.52	.75	.693
Southeast to Florida	1.32	1.77	.746
Total	3.77	4.70	.802
Mid-Atlantic to Southeast	1.59	1.97	.807

1/ Interregional marketings occur between adjacent regions. Marketings between nonadjacent regions comprise separate marketings between adjacent regions.

2/ Imputed marketing costs are the observed differences in overall blend prices between regions.

3/ This proportion is the marketing cost divided by transportation cost, where marketing is the difference in adjacent regional blend prices and transportation costs are based on 35 cents per cwt per 100 miles. A proportion of 1 implies that all milk marketed is transported. A proportion less than 1 implies pooled quantities exceed transported quantities.

4/ The proportion of imputed marketing to transportation costs exceeding 1 is clearly atypical and is hypothesized to be associated with the transition between midwestern and southern milk markets and the operation of producer marketing cooperatives.

costs), and for any other assumption needed to facilitate simulation of the policy alternatives.

1985 Base

- o 1985 minimum Class I differentials.
- o 1985 over-order payments.
- o 1985 imputed marketing costs.

Reconstitution Under a Single Basing Point

- o 1985 minimum Class I differentials.
- o 1985 over-order payments in all regions, except in deficit regions, where they are lowered to 11 cents to cover balancing costs.
- o A transportation cost of 17.5 cents per cwt per 100 miles, reflecting a 50-percent concentrate.
- o 1985 estimated pooling requirements.
- o Fixed costs of reverse osmosis filtration assessed at 35 cents per cwt.
- o Unrestricted California exports.

National Milk Marketing Order

- o Regional Class I differentials set to include 1985 minimum Class I differentials and 1985 over-order payments.
- o A reserve requirement of 10 percent of fluid use set for each region.
- o A transportation cost of 35 cents per cwt per 100 miles.
- o No pooling requirements, reflecting a single national revenue pool.
- o Equal blend prices for all regions net of average transportation costs.
- o Unrestricted California exports.

No Classified Pricing

- o Elimination of minimum Class I and Class II differentials.
- o Market-generated regional milk prices above the M-W price.
- o Regional fluid marketing costs of 22 cents in all regions.
- o Transportation costs of 35 cents per cwt per 100 miles.
- o Elimination of pooling requirements; milk must be received in a region for it to be sold at the regional price.
- o California exports held at 1985 levels.

Multiple Basing Points

- o Regions with Class I use of 60 percent or less (seven regions) designated as basing points.
- o Minimum Class I differentials increase from basing point regions, where minimum differentials are $1.12 at 3.5-percent butterfat.
- o Over-order payments of 22 cents in all regions to cover regional fluid marketing costs.
- o Transportation costs of 35 cents per cwt per 100 miles.
- o 1985 estimated pooling requirements.
- o California minimum prices and exports held at 1985 levels.

Mathematical Specification

The mathematical specification of the model begins with the formal statement of the demand and supply functions and the conditions that must be met in the forms of constraints.

The following are the plant-level demand functions for fluid and manufacturing milk in hard and soft product uses and the supply functions for Grade A and Grade B milk.

The quantity of fluid milk demanded in region j (yf_j) is a function of its own price (pf_j):

$$yf_j = yf_j(pf_j) \qquad (1)$$

The quantity of milk demanded for national use of hard manufactured products (ymh) is a function of its own price (pmh):

$$ymh = ymh(pmh) \qquad (2)$$

The quantity of milk demanded for national use of soft manufactured products (yms) is a function of its own price (pms):

$$yms = yms\ (pms) \quad (3)$$

The quantity of Grade A milk supplied in region i (xa_i) is a function of its own price (ra_i):

$$xa_i = xa_i\ (ra_i) \quad (4)$$

The quantity of Grade B milk supplied in region i (xb_i) is a function of its own price (rb_i):

$$xb_i = xb_i\ (rb_i) \quad (5)$$

In inverse form, these functions are written as follows:

$$pf_j = df_j\ (yf_j) \quad (6)$$

$$pmh = dmh\ (ymh) \quad (7)$$

$$pms = dms\ (yms) \quad (8)$$

$$ra_i = sa_i\ (xa_i) \quad (9)$$

$$rb_i = sb_i\ (xb_i) \quad (10)$$

These functions form the basis of the aggregate welfare function to be optimized subject to the following constraints embodying the pricing regulations and commodity balance constraints.

The price of milk in fluid use in region j (pf_j) is at least as great as the price of milk in hard manufactured products (pms) plus the Class I differential ($d1_j$):

$$pf_j - pmh - d1_j \geq 0 \quad (11)$$

The price of milk in hard manufactured products is at least as great as the effective support price (pmh^o):

$$pmh - pmh^o \geq 0 \quad (12)$$

The national average price of milk in soft manufactured products is equal to the price of milk in hard manufactured products plus a soft product differential, d2:

$$pms - pmh - d2 \geq 0 \quad (13)$$

The model requires that the Grade A blend price include no greater than two use classes. Therefore, in calculating the blend price, the two manufacturing classes are aggregated, implying that Class II in the model includes both hard and soft manufacturing use of Grade A milk. The effective blend price in region j (pp_j) is at least as great as the price of milk in hard manufacturing uses plus the regional Class I and Class II differentials ($d1_j$ and $d2_j$) times the respective proportions of pooled milk (xp_j) in each use ($x1_j$ and $x2_j$):

$$pp_j - pmh - (d1_j * x1_j + d2_j * x2_j)/xp_j \geq 0 \quad (14)$$

Effective blend prices in each importing region (pp_j) can be no greater than the blend price in each exporting region (pp_i) plus the interregional marketing costs (ta_{ij}). Effective blend prices are aligned by interregional marketing costs:

$$pp_i + ta_{ij} - pp_j \geq 0 \quad (15)$$

The effective price for regulated Grade A milk producers in each region (ra_j) is at least as great as the regional effective blend price (pp_i):

$$ra_i - pp_i \geq 0 \quad (16)$$

The Grade B price in each region (rb_i) plus a differential (db_i) is at least as great as the price of milk used in hard manufactured products (pmh), also equal to the M-W price. The differentials (db_i) relate the regional Grade B milk prices to the M-W price:

$$rb_i + db_i - pmh \geq 0 \quad (17)$$

The quantity of Grade A milk produced in each region (xa_i) must be at least as great as the amount transported or pooled into regional markets ($\Sigma_j xa_{ij}$):

$$xa_i - \Sigma_j xa_{ij} \geq 0 \quad (18)$$

The quantity of milk marketed into each ($\Sigma_i xa_{ij}$) must be at least as great as the pooled quantity (xp_j):

$$\Sigma_i xa_{ij} - xp_j \geq 0 \quad (19)$$

The quantity of milk pooled in each regional market (xp_j) must be at least as great as the amounts moving to Class I and Class II uses ($x1_j$ and $x2_j$):

$$xp_j - x1_j - x2_j \geq 0 \ . \quad (20)$$

The quantity of milk in Class I in each pool ($x1_j$) must be at least as great as the quantity of fluid milk demanded (yf_j):

$$x1_j - yf_j \geq 0 \quad (21)$$

The quantity of milk supplied in the manufactured milk market must be at least as great as the quantities demanded or used. The supply side is composed of the sum of Grade B shipments ($\Sigma_k xb_k$), Grade A milk in

manufacturing uses ($\Sigma_j x2_j$), stocks (BS), and imports (I). The demand side is composed of ending commercial stocks (ES) and the quantities of milk demanded in soft manufacturing uses (yms), hard manufacturing uses (ymh), and Government purchases (yg):

$$\Sigma_k xb_k + \Sigma_j x2_j + BS + I - ES - yms - ymh - yg \geq 0 \qquad (22)$$

The model includes the interregional marketing of Grade A milk at average marketing costs (ta_{ij}). Raw milk is assumed to move out of the production region only in conjunction with serving fluid milk markets. Thus, interregional marketing of Grade B or Grade A milk specifically for use in hard manufactured products is not considered.

The objective function is the sum of producer and consumer surplus. It is written as the sum of the integrals under the demand functions less the sum of the integrals under the supply functions less interregional marketing costs. The objective function and the institutional constraints stated above are combined to form a constrained nonlinear programming problem. This problem is maximized with respect to the quantities in the model and the Lagrangian multipliers associated with each constraint.

The model is modified slightly for the no classified pricing and national order alternatives. The national order alternative requires that equation (4), the blend price equation, be modified to be a weighted average blend price over all regions.

Under the no classified pricing alternative, two changes are made. First, the regional fluid demand functions are shifted out to include regional demand for milk in soft manufactured products. Second, the blend price equation is modified by setting the Class I differential in each region at 22 cents, the regional marketing cost applied to milk used in fluid and soft manufactured products.

No Classified Pricing Results

The prices (f.o.b. plants) generated for Grade A milk in all regions include a 22-cent marketing cost if the milk is used in fluid or soft manufactured products. Grade A milk prices in exporting and importing regions are higher, reflecting the demand for imports in deficit regions and transportation costs associated with interregional milk marketing. Thus, average Grade A milk prices exceed Grade B prices (f.o.b. plants) by at least 32 cents in all regions where both are produced, except in the Mid-Atlantic region where Grade A milk prices exceed Grade B prices by 18 cents and in the Lake States where there is no difference in prices (table 8 and app. table 2). In the Lake States, the manufacturing milk price is the M-W average price paid for Grade B milk. Given that the Lake States region is no longer an exporter under the no classified pricing alternative, Grade A producers in outlying regions are assumed to revert back to Grade B. This reversion would continue until a new interregional equilibrium is reached. Such an equilibrium would be characterized by Grade A milk production at higher cost surrounding the urban fluid milk markets and Grade B milk production in strictly rural areas where milk is most economically manufactured into cheese or butter and powder near its production location.

The results of abandoning classified pricing and revenue pooling reflect only the effects of lower prices resulting from differentials that include only the additional costs of marketing milk used in fluid and soft manufactured products. The price decline reduces quantity along the supply functions. Economic theory indicates that if dairy farmers are averse to risk and uncertainty, then an increase in price variability or market uncertainty would require a higher price for the same quantity to be produced (*19*). This implies that the supply functions would shift to the left if dairy farmers are risk averse and if abandoning classified pricing and revenue pooling resulted in greater price variability or market uncertainty. If alternative institutions were not put into place and greater risk and uncertainty prevailed, supply functions would shift to the left, resulting in lower milk production and higher average prices than this study's results show. Given the inelastic demand functions for milk in fluid and manufacturing uses, total revenues to producers would rise as well.

As long as the dairy price support program is effective, no major increase in the variability of prices would be expected. Some markets and regions, however, could be faced with greater price variability and noncompetitive conditions unless some alternative marketing and risk-bearing institutions were put into place. This issue is not addressed in this study and supply functions are not shifted. Therefore, the study assumes that if classified pricing and revenue pooling were abandoned, alternative institutions would be put into place that would maintain an equally stable environment but allow average price levels to adjust.

This policy alternative can be used to identify the effects of market forces alone on Grade A and fluid milk prices and quantities in an environment of no greater risk. These results provide a benchmark for setting minimum Class I differentials such that market stabilization is reached with minimum distortion of economic forces.

Appendix II: Actual Values Tables

Appendix tables 6-13 present the values of the variables for each policy alternative. They are the actual values that generate absolute and percentage changes from the 1985 base.

Appendix table 6--Regional Grade A milk revenues

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconsti-tution	National marketing order	No classi-fied pricing	Multiple basing points	Support price cut alone	Reconsti-tution	National marketing order	No classi-fied pricing	Multiple basing points
					Million dollars					
Northeast	2,199.49	2,215.65	2,116.91	1,824.69	2,029.83	1,964.04	1,976.93	1,877.89	1,616.60	1,787.18
Mid-Atlantic	2,032.17	2,049.79	1,987.43	1,725.97	1,858.05	1,825.63	1,840.34	1,776.20	1,540.02	1,649.13
Corn Belt	2,261.07	2,250.22	2,265.19	1,977.29	2,157.58	2,034.21	2,015.21	2,031.21	1,770.93	1,925.36
Kentucky-Tennessee	421.33	372.54	356.93	355.33	371.32	370.57	323.91	309.63	311.34	322.68
Southeast	596.59	526.78	492.87	535.43	542.52	539.05	470.87	438.69	483.39	485.87
Florida	324.98	256.88	208.68	303.74	291.11	288.65	224.13	179.46	270.68	256.10
Deep South	337.72	308.84	288.23	317.68	311.14	302.01	273.79	254.38	284.87	275.18
Lake States	3,342.78	3,523.60	3,681.90	3,138.42	3,275.41	2,961.91	3,120.45	3,274.61	2,782.40	2,901.31
Northern Plains	192.84	198.33	197.73	174.08	190.93	174.38	179.02	178.56	157.42	171.25
Southern Plains	830.40	817.08	753.37	796.66	826.91	733.79	719.43	659.84	748.16	725.83
Mountains	343.99	336.11	330.28	293.98	335.16	308.50	300.50	294.88	262.86	299.44
Northwest	825.78	830.06	868.09	759.11	802.75	743.73	746.95	783.87	683.97	720.11
Southwest	325.59	307.94	302.69	251.91	287.69	282.51	265.65	260.74	216.87	246.26
California	1,961.53	2,004.32	2,114.77	1,848.28	1,961.53	1,777.59	1,821.99	1,930.57	1,684.18	1,777.59
Total	15,996.27	15,998.16	15,965.08	14,302.55	15,241.94	14,306.57	14,279.16	14,250.53	12,813.67	13,543.29

Appendix table 7--Regional fluid milk expenditures

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconsti-tution	National marketing order	No classi-fied pricing	Multiple basing points	Support price cut alone	Reconsti-tution	National marketing order	No classi-fied pricing	Multiple basing points
					Million dollars					
Northeast	1,290.64	1,290.64	1,290.64	1,041.48	1,150.90	1,203.36	1,203.36	1,203.36	970.55	1,061.72
Mid-Atlantic	934.92	934.92	934.92	775.39	854.93	869.74	869.74	869.74	722.59	788.63
Corn Belt	1,161.74	1,161.74	1,161.74	992.73	1,096.38	1,078.22	1,078.22	1,078.22	925.46	1,011.92
Kentucky-Tennessee	225.75	217.17	225.75	198.68	208.24	210.34	201.64	210.34	186.32	194.72
Southeast	593.89	570.26	593.89	534.28	553.22	554.64	530.70	554.64	502.98	518.84
Florida	380.20	344.00	380.20	356.50	359.87	356.92	320.28	356.92	338.02	339.54
Deep South	280.43	271.32	280.43	257.98	261.98	261.28	252.05	261.28	242.75	242.58
Lake States	598.40	598.40	598.40	514.15	567.72	555.20	555.20	555.20	479.45	524.07
Northern Plains	110.42	110.42	110.42	94.43	104.28	102.49	102.49	102.49	88.01	96.26
Southern Plains	706.19	680.30	706.19	644.44	677.21	657.32	631.07	657.32	623.42	627.95
Mountains	272.55	267.51	272.55	230.13	260.01	253.17	248.07	253.17	214.53	240.46
Northwest	288.89	288.89	288.89	249.48	275.25	268.09	268.09	268.09	232.76	254.25
Southwest	187.41	185.77	187.41	155.03	171.30	174.38	172.72	174.38	144.54	158.04
California	874.61	874.61	874.61	782.49	874.61	808.41	808.41	808.41	729.59	808.41
Total	7,906.03	7,795.96	7,906.03	6,827.19	7,415.88	7,353.54	7,242.01	7,353.54	6,400.98	6,867.37

Appendix table 8--Regional fluid use of pooled Grade A milk

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
					Percent					
Northeast	44	46	53	57	54	47	48	56	60	57
Mid-Atlantic	49	52	42	45	43	52	55	44	46	45
Corn Belt	49	47	48	53	50	53	49	52	58	54
Kentucky-Tennessee	75	57	90	82	77	80	60	90	82	77
Southeast	80	58	90	80	82	84	60	90	80	82
Florida	88	79	90	81	88	91	83	90	81	88
Deep South	75	62	90	80	81	80	65	90	80	86
Lake States	17	18	15	16	16	17	19	16	17	17
Northern Plains	39	51	51	54	57	42	53	53	64	60
Southern Plains	60	71	82	81	78	64	76	88	81	82
Mountains	58	56	74	77	68	61	60	77	81	73
Northwest	34	36	31	32	33	35	37	32	33	33
Southwest	57	46	55	60	56	61	48	60	65	61
California	41	41	40	41	41	42	43	41	42	42
Market	44	44	44	46	45	46	46	46	48	47

Appendix table 9--Regional Grade A milk production

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
	Million pounds									
Northeast	16,433	16,479	16,196	15,307	15,939	15,741	15,780	15,475	14,618	15,186
Mid-Atlantic	15,367	15,411	15,252	14,544	14,910	14,822	14,862	14,685	13,996	14,323
Corn Belt	17,307	17,280	17,317	16,581	17,050	16,732	16,682	16,725	16,008	16,441
Kentucky-Tennessee	2,956	2,787	2,731	2,725	2,783	2,780	2,607	2,552	2,558	2,602
Southeast	4,038	3,860	3,768	3,883	3,901	3,892	3,706	3,612	3,741	3,748
Florida	2,019	1,795	1,618	1,952	1,911	1,903	1,676	1,500	1,843	1,792
Deep South	2,379	2,296	2,234	2,322	2,303	2,276	2,189	2,126	2,224	2,193
Lake States	27,123	27,654	28,104	26,501	26,920	25,942	26,445	26,918	25,352	25,746
Northern Plains	1,500	1,512	1,510	1,459	1,496	1,460	1,470	1,469	1,419	1,452
Southern Plains	6,064	6,021	5,813	5,956	6,053	5,747	5,697	5,487	5,795	5,719
Mountains	2,593	2,573	2,558	2,460	2,571	2,500	2,478	2,462	2,369	2,475
Northwest	6,485	6,494	6,576	6,334	6,434	6,298	6,305	6,391	6,152	6,241
Southwest	2,404	2,338	2,318	2,114	2,259	2,239	2,171	2,150	1,961	2,090
California	16,021	16,084	16,241	15,849	16,021	15,737	15,808	15,975	15,583	15,737
Total	122,689	122,585	122,236	117,986	120,551	118,068	117,877	117,527	113,621	115,747

Appendix table 10--Regional quantities of pooled Grade A milk

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
	Million pounds									
Northeast	19,313	18,493	16,196	15,307	15,939	18,433	17,761	15,475	14,618	15,186
Mid-Atlantic	12,931	12,268	15,252	14,544	14,910	12,243	11,682	14,685	13,996	14,323
Corn Belt	16,625	17,280	17,127	15,567	16,308	15,494	16,682	15,910	14,422	15,216
Kentucky-Tennessee	2,008	2,671	1,673	1,862	1,966	1,902	2,548	1,683	1,871	1,984
Southeast	4,827	6,668	4,261	4,859	4,734	4,607	6,411	4,287	4,882	4,760
Florida	2,595	2,903	2,529	2,830	2,615	2,513	2,778	2,543	2,843	2,623
Deep South	2,487	3,017	2,078	2,344	2,325	2,368	2,887	2,091	2,356	2,193
Lake States	24,487	23,504	28,104	26,501	26,920	24,357	22,558	26,918	25,352	25,746
Northern Plains	1,983	1,526	1,510	1,459	1,380	1,862	1,465	1,469	1,243	1,318
Southern Plains	7,953	6,765	5,813	5,956	6,169	7,551	6,344	5,487	5,972	5,853
Mountains	3,275	3,366	2,558	2,484	2,816	3,111	3,203	2,462	2,393	2,624
Northwest	6,066	5,702	6,576	6,366	6,245	5,879	5,581	6,391	6,184	6,149
Southwest	2,218	2,755	2,318	2,157	2,302	2,110	2,660	2,150	2,004	2,133
California	15,922	15,666	16,241	15,750	15,922	15,638	15,319	15,975	15,484	15,638
Total	122,689	122,585	122,236	117,986	120,551	118,068	117,877	117,527	113,621	115,747

Appendix table 11--Regional Grade A milk prices

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
	Dollars per cwt									
Northeast	13.38	13.45	13.07	11.92	12.73	12.48	12.53	12.14	11.06	11.77
Mid-Atlantic	13.22	13.30	13.03	11.87	12.46	12.32	12.38	12.10	11.00	11.51
Corn Belt	13.06	13.02	13.08	11.92	12.65	12.16	12.08	12.15	11.06	11.71
Kentucky-Tennessee	14.25	13.37	13.07	13.04	13.34	13.33	12.42	12.14	12.17	12.40
Southeast	14.77	13.65	13.08	13.79	13.91	13.85	12.71	12.15	12.92	12.96
Florida	16.09	14.31	12.90	15.56	15.23	15.17	13.37	11.97	14.69	14.29
Deep South	14.19	13.45	12.90	13.68	13.51	13.27	12.51	11.97	12.81	12.55
Lake States	12.32	12.74	13.10	11.84	12.17	11.42	11.80	12.17	10.97	11.27
Northern Plains	12.85	13.12	13.09	11.93	12.76	11.95	12.18	12.16	11.09	11.79
Southern Plains	13.69	13.57	12.96	13.38	13.66	12.77	12.63	12.03	12.91	12.69
Mountains	13.26	13.06	12.91	11.95	13.04	12.34	12.13	11.98	11.10	12.10
Northwest	12.73	12.78	13.20	11.98	12.48	11.81	11.85	12.27	11.12	11.54
Southwest	13.54	13.17	13.06	11.92	12.73	12.62	12.24	12.13	11.06	11.78
California	12.24	12.46	13.02	11.66	12.24	11.30	11.53	12.09	10.81	11.30
Market average	13.04	13.05	13.06	12.12	12.64	12.12	12.11	12.13	11.28	11.70

Appendix table 12--Regional fluid milk prices

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
	Dollars per cwt									
Northeast	15.12	15.12	15.12	11.99	13.35	14.01	14.01	14.01	11.12	12.24
Mid-Atlantic	14.67	14.67	14.67	11.98	13.31	13.56	13.56	13.56	11.11	12.20
Corn Belt	14.23	14.23	14.23	12.00	13.36	13.12	13.12	13.12	11.13	12.25
Kentucky-Tennessee	14.98	14.36	14.98	13.04	13.72	13.87	13.25	13.87	12.17	12.76
Southeast	15.47	14.80	15.47	13.79	14.32	14.36	13.69	14.36	12.92	13.36
Florida	16.69	14.97	16.69	15.56	15.72	15.58	13.86	15.58	14.69	14.76
Deep South	14.98	14.45	14.98	13.68	13.91	13.87	13.34	13.87	12.81	12.80
Lake States	14.17	14.17	14.17	12.02	13.38	13.06	13.06	13.06	11.15	12.27
Northern Plains	14.23	14.23	14.23	12.01	13.37	13.12	13.12	13.12	11.14	12.26
Southern Plains	14.78	14.19	14.78	13.38	14.12	13.67	13.08	13.67	12.91	13.01
Mountains	14.39	14.10	14.39	11.98	13.67	13.28	12.99	13.28	11.11	12.56
Northwest	14.21	14.21	14.21	12.12	13.48	13.10	13.10	13.10	11.25	12.37
Southwest	14.71	14.57	14.71	11.98	13.34	13.60	13.46	13.60	11.11	12.23
California	13.52	13.52	13.52	11.98	13.52	12.41	12.41	12.41	11.11	12.41
Market average	14.64	14.42	14.64	12.48	13.65	13.53	13.31	13.53	11.65	12.56

Appendix table 13--Regional fluid milk quantities

Region	$11.97 support price					$11.10 support price				
	1985 base	Reconstitution	National marketing order	No classified pricing	Multiple basing points	Support price cut alone	Reconstitution	National marketing order	No classified pricing	Multiple basing points
	Million pounds									
Northeast	8,536	8,536	8,536	8,686	8,621	8,589	8,589	8,589	8,728	8,674
Mid-Atlantic	6,373	6,373	6,373	6,472	6,423	6,414	6,414	6,414	6,504	6,464
Corn Belt	8,164	8,164	8,164	8,273	8,206	8,218	8,218	8,218	8,315	8,261
Kentucky-Tennessee	1,507	1,512	1,507	1,524	1,518	1,516	1,522	1,516	1,531	1,526
Southeast	3,839	3,853	3,839	3,874	3,863	3,862	3,877	3,862	3,893	3,884
Florida	2,278	2,298	2,278	2,291	2,289	2,291	2,311	2,291	2,301	2,300
Deep South	1,872	1,878	1,872	1,886	1,883	1,884	1,889	1,884	1,895	1,895
Lake States	4,223	4,223	4,223	4,277	4,243	4,251	4,251	4,251	4,300	4,271
Northern Plains	776	776	776	786	780	781	781	781	790	785
Southern Plains	4,778	4,794	4,778	4,816	4,796	4,809	4,825	4,809	4,829	4,827
Mountains	1,894	1,897	1,894	1,921	1,902	1,906	1,910	1,906	1,931	1,914
Northwest	2,033	2,033	2,033	2,058	2,042	2,046	2,046	2,046	2,069	2,055
Southwest	1,274	1,275	1,274	1,294	1,284	1,282	1,283	1,282	1,301	1,292
California	6,469	6,469	6,469	6,532	6,469	6,514	6,514	6,514	6,567	6,514
Total	54,016	54,082	54,016	54,692	54,320	54,365	54,430	54,365	54,954	54,663
Commercial manufacturing	76,951	76,951	76,951	76,919	76,951	78,208	78,346	78,346	78,170	78,346
CCC purchases	13,167	12,997	12,714	7,820	10,725	6,206	5,811	5,527	1,208	3,449

Glossary

Allocation provision. The Federal order procedure in which imported milk, regardless of use, is allocated to a manufacturing class when local milk for fluid use is available. This procedure reserves as much of the Class I allocation as possible for producers within the order, increases the order's blend price, and reduces unnecessary transportation.

Balancing. The market service of moving milk between various uses and among processors to meet fluctuating needs from varying supplies.

Blend price. A weighted average price based on the proportion of Grade A milk in a pool allocated to each of the use classes. Producers participating in a pool receive its blend price with adjustments for butterfat content and farm location.

Class I differential. The amount added to the M-W price to obtain a given region's Class I price. Two components make up each region's effective or total Class I differential: a minimum Federal order differential and an over-order payment.

Class I milk. Grade A milk used to produce fluid milk products under a Federal marketing order.

Class II milk. Grade A milk used in cream products or soft manufactured products (ice cream, cottage cheese, and yogurt) under a Federal marketing order with three classes. The Class II designation also refers to Grade A milk used to produce any manufactured dairy product under a Federal marketing order with only two classes.

Class III milk. Grade A milk used to produce hard manufactured dairy products (cheese, butter, canned milk, and dry milk) under a Federal marketing order with three classes.

Classified pricing. The Federal order pricing system under which regulated processors pay into the pool for Grade A milk according to the class in which it is used.

Commodity Credit Corporation (CCC). The Government agency that purchases storable products on the open market at an announced price. CCC purchases directly support the market price of manufactured dairy products and indirectly support the price of all milk.

Compensatory payment. An assessment paid on milk or components for reconstitution shipped into a Federal order from another order or market. The assessment is equal to the difference between the order's Class I price and its Class III price in some situations and between the order's Class I price and its blend price in other situations.

Cooperative. A firm that is owned by its farmer-members, is operated for their benefit, and distributes earnings on the basis of patronage (volume of milk).

Federal milk marketing order. A regulation issued by the Secretary of Agriculture specifying minimum prices and conditions under which milk can be bought and sold within a specified area.

Fluid use. The proportion of Grade A milk pooled in a market and used to produce fluid (Class I) products.

Fluid product. See Class I milk.

Give-up charge. The price needed to attract milk away from profitable manufacturing operations because lower volume increases costs of manufacturing. This charge is included in over-order payments.

Grade A milk. Milk produced under sanitary standards that qualify it for fluid consumption. Only Grade A milk is regulated under Federal milk marketing orders.

Grade B milk. Milk not meeting Grade A standards; less stringent standards generally apply.

Handlers. Generally refers to fluid milk processors and includes manufacturing plants that also supply fluid milk markets.

Hard manufactured dairy products. Storable manufactured dairy products, including butter, nonfat dry milk, and cheese.

Interregional marketing costs. The average cost of marketing milk interregionally is equal to the actual average cost of transporting milk times the proportion of the milk marketed that is actually transported.

Make allowance. The margin between the Government support price and the CCC announced price for

butter, nonfat dry milk, and cheese. This margin is administratively set to reach the desired level of prices for milk in manufacturing uses.

Manufacturing milk. Grade B milk, or Grade A milk assigned to Classes II or III or otherwise used in the production of a manufactured product.

Manufacturers. Generally refer to the manufacturers of cheese, butter, nonfat dry milk, or other storable dairy products.

Minnesota-Wisconsin (M-W) price. The average price per cwt paid to farmers for Grade B milk in Minnesota and Wisconsin as estimated by USDA.

Over-order payment. A payment negotiated between buyers and sellers to cover the cost of providing market services or attracting milk away from manufacturing plants. Over-order payments could also result from market power.

Processors. Generally refer to firms that process raw Grade A milk into fluid dairy products.

Reconstituted milk. Fluid milk recombined from ingredients (nonfat dry milk, condensed milk, and butterfat) or concentrated milk.

Revenue pool. With a classified pricing system such as that used in Federal and State orders, processors pay for milk at different prices for each use category. Producers are paid a weighted average, or "blend," price for all uses of milk in a particular order or market. Processors pay into the pool on the basis of their uses of milk; these are the pool revenues. Producers participating in the pool receive identical uniform blend prices, with adjustments for butterfat content and location of the farm.

Reverse osmosis filtration. A membrane separation technique used to remove water from fluid milk, yielding a concentrate for shipping and recombining at the final destination. The process can yield a concentrate of about 50 percent without altering the milk's key taste and nutrient characteristics.

Soft manufactured dairy products. Manufactured dairy products with limited storage life, including ice cream, cottage cheese, yogurt, and sour cream.

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